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THE IMPACT OF NEW ELECTRONIC IMAGING SYSTEMS ON U.S. AIR FORCE VISUAL INFORMATION PROFESSIONALS

by

Lee E. Thomas

An Applied Project Presented in Partial Fulfillment
of the Requirements for the Degree
Master of Mass Communication

Walter Cronkite School of Journalism and Telecommunication
Arizona State University

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ABSTRACT

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Research Question

How does using electronic imaging technology affect a media professional's self-reported job satisfaction, job diversity, and their attitude toward change in the workplace?

The Study

Senior Air Force visual information (VI) managers have set aside up to $40 million dollars to buy new electronic imaging equipment over four years. This study examined the impact of these electronic imaging systems on job outcomes such as job diversity, job satisfaction, and attitude toward change. A mail questionnaire was used to collect data from Air Force VI professionals on their use of electronic imaging systems and their job-attitudes. From the data, it was concluded that media professionals who use more electronic imaging technologies have greater job diversity, job interest, and job satisfaction than those who use them less or not at all. It was also found that using new imaging technologies can increase acceptance of the future introduction of new technology. Training and system "user friendliness" were found to increase user acceptance of electronic imaging systems. Data on Air Force training for new systems showed that better training is needed to support the implementation process.

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INTRODUCTION

Every day around the world, thousands of people in the U.S. Air Force produce and give briefings on everything from aircraft status to current budget issues. These military briefings are used at every level of command and are often the primary decision-making tool of the "corporate" Air Force. Even professional military education programs include prominent sections on how to organize and present quality briefings. Good Air Force briefers are taught to depend heavily on visual aids for their briefings. They learn that good visuals can increase retention of the subject matter and improve the communication process (Air Force pamphlet 13-2, 1985).

The vast size and scope of Air Force operations creates an equally large demand for visual aids. Visual aids and audiovisual products are used every hour of every day to support innumerable briefings, provide training, enhance internal communications, and to help show the public what the Air Force is doing. Day-to-day visual materials used in the Air Force include photographic prints, slides, viewgraphs, and electronic presentations (Air Force Regulation 700-32 vol. II, 1988). Like most

other government agencies and large corporations, the Air Force uses its own in-house capability to produce visual aids. In the Air Force and throughout the Department of Defense, this internal functional area is referred to as visual information (VI).

Base Visual Information Centers

Ever since the end of World War II, the majority of Air Force visual aids have been created by a small cadre of specialty equipped people who are trained to produce visual products. Their unique military profession has developed over the last 40 years until today they have their own management structure, equipment rosters, and technical schools. In the mid-1980s, the name of this Air Force functional area was changed from "audiovisual services" to Visual Information (VI). The term visual information was chosen because it best describes the role visual products play in the modern military. It also helps to distinguish this activity from other functions which produce film or television productions.

Most Air Force VI professionals work in organizations which provide consolidated visual information support for their local base. These organizations are called Base Visual Information Support Centers (BVISC). Base visual information functions provide VI products and services to meet Air Force mission requirements. BVISCs are established at Air Force installations to serve the host VI requirements (Air Force Regulation 700-32 vol. II, 1988) These base VI centers provide a cost-effective way for local base organizations to obtain graphics, photography, and presentations support. BVISC customers simply fill out a work order at the customer service desk and receive

whatever visual products they officially need. If a product is not immediately available, a graphics specialist or photographer can usually produce it for them.

Air Force visual information (VI) organizations can vary in size from a small base with only three VI specialists, to a large Major Air Command base with 60 or more VI specialists. Most VI professionals are enlisted members, while some are federal civilian employees. A few base visual information centers (BVISC) are operated using contract services instead of military or civil service employees. The type of equipment used to produce VI products can also vary by location. Known as visual information equipment, most graphic shops have a mixture of computer graphic systems and manual production materials. The vast majority of Air Force photo labs use automated wet-chemical processing to produce black and white prints, color prints, and slides. To present visual aids while briefing, most Air Force conference rooms have slide and viewgraph projectors. A growing number of these conference rooms also have television monitors or TV projectors to display video/electronic briefing materials.

The visual information functional area remained about the same size through the late 1970s and 1980s. Most new initiatives during this time involved making changes in command structure or introducing new equipment into the base VI support centers. However, as the cold war began winding down in the late 1980s, Air Force visual information managers began to look for ways of reducing costs while still maintaining VI support to their customers. They were concerned that a projected 25% reduction in Air Force manpower would seriously degrade existing base VI capabilities and quality. As they explored the options that were available, some Air Force managers became convinced that electronic-based equipment had an enormous potential to streamline

base VI support centers. What emerged from these inquiries in 1990 was a program called the Electronic Imaging Center (EIC). The EIC concept called for traditional manual-process graphics, photo-chemical processing, and film-based projection systems to be converted to electronic imaging systems by 1995.

The Electronic Imaging Center (EIC) Concept

Visual information managers who supported the EIC concept set about in late 1989 to persuade Air Force leaders that electronic imaging could improve service and save money. EIC advocates argued that the conversion of base visual information centers (BVISC) to all-electronic processes was required to:

> ...maintain quality visual information support to meet customer requirements during an era of sharply declining resources. Electronic processes promise to bring services straight to the customer faster, at lower costs, and with reduced manpower as compared with traditional BVISC processes. Revolutionary breakthroughs in imaging technologies have dramatically altered the way BVISCs can do business (Aerospace Audiovisual, 1991).

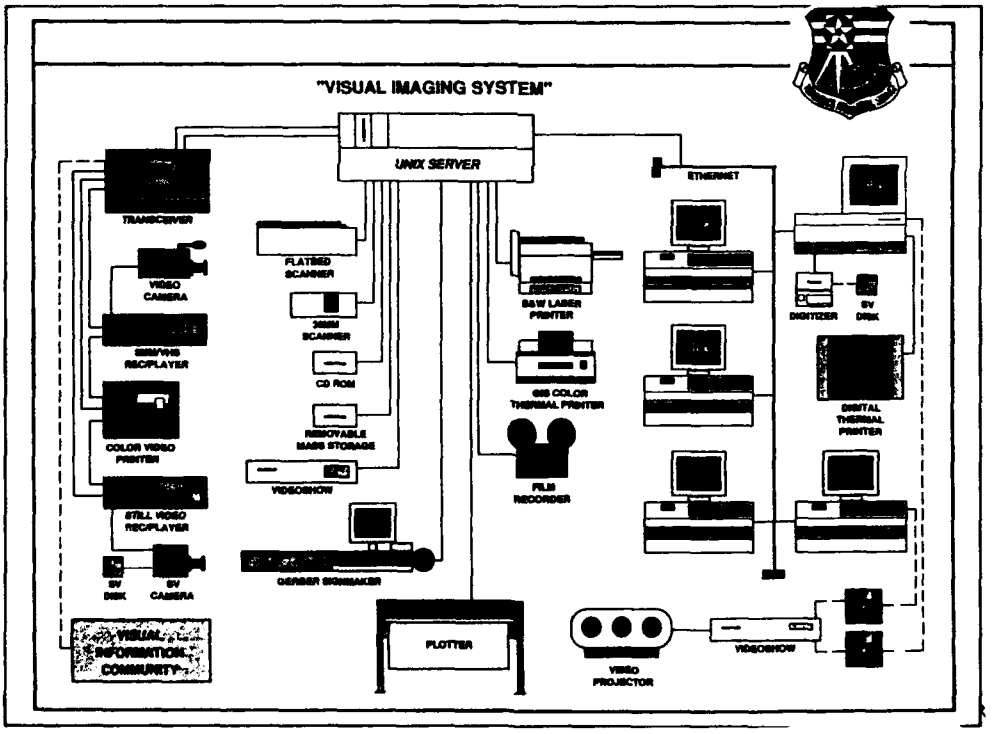
Military advocates promoting the electronic imaging center concept also pointed to the user friendliness and non-polluting nature of these new imaging systems as reasons for beginning the conversion process as soon as possible. EIC advocates estimated that an equipment investment of $18 million dollars over four years could

result in an $85 million dollar savings by the year 2000 (Aerospace Audiovisual, 1991).

The proposed electronic imaging center (EIC) concept relied on a combination of digital and video technologies to create an integrated imaging environment. The broad categories of technology used for the EIC were: (1) still video equipment; (2) a Macintosh-based digital image processing system; (3) graphic imaging systems; (4) portable video systems for presentations; (5) a mutimedia computer network; and (6) fixed-installed electronic presentation systems (Aerospace Audiovisual, 1990). Figure 1 shows the proposed equipment configuration for the EIC concept.

Figure 1.

Proposed Equipment Configurations for the Electronic Imaging Center



In April 1990, the Air Force Program Review Committee (PRC), chartered a test of the EIC concept at four base locations (Aerospace Audiovisual, 1991). These locations were (1) Barksdale AFB, Louisiana; (2) Hurlburt AFB, Florida; (3) Eielson AFB, Alaska; and (4) Elmendorf AFB, Alaska. Each of these locations received between $250 and $500 thousand dollars in new electronic imaging equipment for the test. Manpower and efficiency experts visited each of these locations to validate any EIC savings during the test program. When the test was completed in December 1991, the electronic imaging center concept had been validated as having the potential to save up to $15 million a year. Air Force visual information planners then decided to set aside $40 million to begin procuring electronic imaging systems over a four year period.

Purpose of the Study

The purpose of this applied project is to study the impact of electronic imaging technologies on the people who use them. The primary focus of the study is not intended to be about the new "toys" of electronic imaging. The focus will be instead on how the people who use new electronic imaging systms are changed by them. All too often, the discussion of new media systems is dominated by the technology itself. Most managers make the mistake of thinking these issues are chiefly about computers, networks, software or digital communications (Williams & Hartly, 1990). A few managers realize that the introduction of high-tech systems into the workplace ultimately causes dynamic changes to the organization of that workplace (Colclough & Tolbert, 1992). Traditional relationships between departments, individuals, customers,

and producers are often altered into new and novel associations based on technological requirements (Allen & Hauptman, 1987). Entire departments and classes of workers may be bypassed or eliminated by new technology (Carter & Cullen, 1983). There can even be a sense that the technology itself is taking over. Brand (1988) expressed it this way, "once a new technology rolls over you, if you are not part of the steam-roller, you're part of the road" (p. 22).

Air Force advocates of the proposed electronic imaging center have identified three major consequences of implementing their concept: (1) increased efficiency; (2) cost savings (primarily by reduced manpower); and (3) reduced hazardous waste. Two of these three consequences are among the most frequently cited reasons industrial managers use for introducing new technology into the workplace. These include: improved efficiency, reduced operating cost, increased flexibility, improved quality, and tightening of operational control (Brotherton, 1988; Buchanan, 1983; Child, 1988). On the other hand, management often forgets that new technologies can represent major and frightening changes to their employees (Waddington, 1990). New systems require new skills; new skills require new job descriptions and more training; old skills can become less valued or obsolete. Managers who don't consider the human consequences of implementing new technology are frequently unprepared for the all-too predictable response from employees--ranging from hostile resistance to defensiveness and fear (Morrison, 1989).

Before any new technology can really improve efficiency or working conditions, it must be implemented successfully (Williams & Hartly, 1990). Successful implementation of the EIC concept in the Air Force will depend heavily on the

acceptance and cooperation of visual information professionals in the field. To secure their cooperation, Air Force VI leaders need to know more about the current attitude and perceptions of visual information professionals. They must develop implementation strategies that will increase EIC acceptance and help VI professionals smoothly transition into new technologies.

This study sought to obtain data about the impact of electronic imaging technologies on the attitudes of people who use them. It also collected data on the prevailing mood of VI professionals at base visual information centers in the Air Force. Finally, it examined how using technology can affect a person's job satisfaction and other significant human attitudes. The researcher hopes that a better understanding of the interrelationship between new imaging technology, training, job attitudes, and the amount of EIC systems a person uses will help managers to find the most productive combination of technology and human capacities.

Statement of the Research Question

The research question asked by this study was "How does using electronic imaging technology affect a media professional's self-reported job satisfaction, job diversity, and their attitude toward change in the workplace?"

Sub-Questions

(1) Do media professionals who use more electronic imaging technologies have greater job diversity, job interest and job satisfaction than comparable media professionals who use them less or not at all?

(2) Do media professionals who use more electronic imaging technologies have a more positive attitude toward change than comparable media professionals who use them less or not at all?

(3) Does the quality and amount of training provided for new systems affect a media professional's acceptance of new technology?

(4) Does a participatory management style increase user acceptance of electronic imaging technologies more than using an autocratic style?

(5) Does the "user friendliness" of new electronic imaging systems affect the acceptance of that technology by media professionals?

The researcher hopes that the data acquired and analyzed by addressing these research questions will help Air Force visual information managers to develop a successful implementation strategy for the electronic imaging center (EIC) concept.

Definitions

The following definitions were used in this study to operationalize the relevant dependent and independent variables.

Electronic Imaging Technologies - Audiovisual systems used to produce visual materials by electronic means rather than manual or chemical processes. For the purposes of this study, an electronic imaging technology must be among the following 20 major electronic imaging sub-systems used in the Air Force electronic imaging center (EIC) concept: 35mm film scanner, B & W laser printer, CD-ROM, color laser or thermal printer, digital photo imaging, computer flat image scanner, digital photo printer, digital still camera, film recorder, graphic imaging system, image transceiver,

magneto/optical drive, still video camera, presentation software, still video player, still video recorder, video encoder/decoder, video printer, video projector, video presentation system (i.e. brand name units like VideoShow, LiteShow, etc.).

Media Professional - A graphic artist, presentation specialist, photographer, or visual information manager who works at an Air Force base VI support center. This includes both military enlisted members and federal civil service employees.

Job Diversity - The variety of different job-tasks that a media professional perceives a work situation has on a day-to-day basis as self-reported.

Job Interest - The self-reported degree to which a media professional finds their normal job-tasks to be interesting.

Job Satisfaction - The self-reported degree to which a media professional finds their job situation to be personally satisfying.

Positive Attitude Toward Change - The self-reported degree to which a media professional believes that change will improve their current job situation.

Quality of Training - The degree to which a media professional perceives the training received was excellent, good, adequate, less than adequate or very inadequate as self-reported.

Amount of Training - The self-reported extent to which a media professional has received "a little" or "a lot" of training on a five point Likert scale.

Acceptance of Technology - The self-reported degree to which a media professional thinks that EIC technology will improve their job performance.

Participatory Management Style - The management style associated with improving quality by involving all employees in the process of decision-making.

Autocratic Management Style - The management style associated with concentrating decision making authority within only one or only a few supervisors.

User Friendliness - The self-reported degree to which a media professional thinks that EIC technologies are easy to learn and use.

Scope of the Study

This research project will study the impact of new imaging technologies on graphics, photo, and presentation professionals in the United States Air Force. The Air Force has begun a $40 million program to switch from manual and wet chemical image processing to new digital computer-based systems. This ambitious program, called the electronic imaging center (EIC), is intended to transform the way images are produced, used, and displayed throughout the Air Force.

The electronic imaging conversion program provides a unique look at a large-scale implementation of electronic imaging technologies which will greatly alter how the Air Force VI professionals produce and use visual media. Also, because the status of the implementation process varies greatly from location to location, it affords the researcher an exceptional opportunity to compare the attitudes of those who use electronic imaging technologies with those use more traditional production methods.

Significance of the Study

While most educational, corporate and governmental communication professionals focus on day-to-day work situations, a growing number of innovators are developing models for the application of new technology (Milet, 1987). They see new

communications technology as vital to the future of their organizations. There seems to be a growing realization that the future belongs to media departments that are lean, fast, and flexible with dramatically different roles for professionals (Miles, 1989).

This study sought to obtain data about the impact of electronic imaging technologies on Air Force visual information professionals. The data can be used to help to improve our understanding of how new media technologies affect employee attitudes. Such understanding is essential to the development of more effective technology implementation strategies. This data can also help educational, corporate and government media managers find a better mix between technology and human resource issues.

To date, several researchers have focussed on the impact of management style, technical training, job diversity, and system user friendliness on the process of technology implementation (Baroudi, Olson & Ives, 1986; Davis, 1989; Medcof, 1989; Nelson & Cheney, 1987). The present research project is believed to be one of the first to look at these factors together, along with job satisfaction and the user's attitude toward change in a large government media population.

The researcher hopes that the results of this study will be useful for: (1) mass communication researchers interested in media management, imaging technologies, technology implementation, and related training programs; (2) media managers who wish to more effectively implement and use new technologies in the workplace; (3) academic examination for the purpose of developing or modifying curricula dealing with new media technology.

REVIEW OF THE LITERATURE

Much like corporate and educational media departments, Air Force visual information (VI) activities have their roots in the development of audiovisual technology. Air Force VI job specialties, training, and management structures are based primarily on the technology used to produce visual information products. A close look reveals that the division of labor for VI professionals is based on traditional differences between the systems they use. For example, Graphic artists don't use 35mm cameras (Air Force manpower standard [AFMS] 3274, 1981) and photographers don't use graphic imaging systems (AFMS 3272, 1989). This rather simple fact has led to separate training, separate organizational divisions, and separate Air Force career fields. As for the management of VI activities, photographers are always put in charge of photo labs and graphic artists are always put in charge of base graphics.

The point of this observation is that much of what is taken for granted today in the Air Force visual information community (i.e. training, job specialties and departments) actually evolved more from audiovisual technology than from present functional realities. There is no overwhelming functional reason for graphic artists not to use 35mm cameras or for photographers not to use graphic imaging systems--it just

developed that way over many years. Recently, decision makers at the Air Force functional management office for visual information melded the graphic and presentations career areas into a single area called "Visual Information Specialist" (G. A. Twedt, personal communication, December 2, 1992). The decision to join these two specialties was based in part on technologically-driven changes to the equipment they both used. This trend of visual information specialties blending into one another is expected to continue through the 1990s. In order to better understand how electronic imaging systems may redefine the jobs of Air Force VI professionals, we should first examine the historical development of private and government (non-entertainment) media in the United States.

History of Educational and Corporate Media

The development of educational media has closely paralleled the development of many commercial media forms in the 20th century. The use of lantern slides and stereographs in public school systems can be traced back to the 1880's. This educational application of media technology led some in the academic community to coin the term "visual instruction" to describe this new academic specialty (Wood & Wylie, 1977). As early as 1910, some schools began adapting motion picture films for instructional use. In 1913, Thomas Edison was so inspired by the instructional potential of his new motion picture technology that he made this overenthusiastic prediction:

> Books will soon be obsolete in the schools. Scholars will soon be instructed through the eye. It is possible to teach every branch of human knowledge with the motion picture. Our school systems will be completely changed in ten years (Saettler, 1968, p. 199.).

It wasn't until four years after Mr. Edison's grandiose statements about visual media in education that the city of Chicago established the first Bureau of Visual Instruction (Brown & Norberg, 1965). After this, the visual instruction movement began a period of slow but significant growth. During the 1920s, public schools started using educational films to teach subjects such as health and hygiene. Colleges and universities began offering a few credit courses in visual instruction (VI) and even conducted research studies on the subject. A growing number of VI departments became firmly established in the public schools, universities and state departments of education (Saettler, 1968). Several important professional associations were formed in the 1920s: the National Academy of Visual Instruction (NAVI) developed standards for visual materials in schools; the Visual Instruction Association of America (VIAA) conducted technology demonstrations promoting visual instruction; and the National Education Association (NEA) established the Department of Visual Instruction (DVI) which was destined to become the dominant professional voice of the VI movement through the 1930s and 1940s. Two decades later, in 1947, the Department of Visual Instruction added "audio" to its title, becoming the Department of Audio-Visual Instruction (DAVI) (Wood & Wylie, 1977). Thus, by the late 1940s, audiovisual instruction had become firmly established as a viable part of the educational domain.

The 1950s began a period of unprecedented expansion in the use of educational media. The introduction of educational television (ETV) in 1952 and a growing interest in programmed instructional technology brought high-visibility to the educational media discipline. In addition, two important social factors added a sense of urgency to the development of educational media in the 1950s: (1) the sharp rise in school populations following World War II, and (2) the advent of the "space race" (Kinder, 1973).

Prior to the 1950s, a number of colleges and universities had experimented with educational radio broadcasts. The first of these was Wisconsin's experimental station 9XM which began broadcasting in 1917 and later became station "WHA." However, even though hundreds of radio broadcast licenses had been issued to educational institutions over a period of 30 years, there were only 37 non-commercial AM stations on the air in 1951 (Powell, 1962). Nevertheless, a dramatic rise in school enrollments after World War II and a growing shortage of qualified college instructors led the educational broadcasting community to see the emerging medium of television as a possible solution. When the FCC released its Sixth Report and Order in 1952, it called for 242 television channels nation-wide to be reserved for non-commercial purposes (Wood & Wylie, 1977). The educational broadcasting community quickly moved into the television age. The first non-commercial ETV station went on the air in 1953 and by the end of the decade there were 52 educational stations in operation and another 19 under construction (Ford Foundation, 1961). Virtually all of these stations received a financial start from private organizations. One of these, the Ford Foundation, (a private philanthropic organization concerned with improving society on a world-wide scale) established the Fund for Adult Education in 1951 specifically to promote the growth of ETV (Powell, 1962).

The 1950s were a period of growth for other forms of educational media as well. Hundreds of schools and colleges began using programmed materials and "autoinstructional" devices (machine-assited learning devices) in their programs. A study sponsored by the NEA's Department of Audio-Visual Instruction in 1954 found that the number of sound-motion picture projectors in schools had increased 140% in only seven years. A U.S. Office of Education Study in 1958 revealed that over 500,000

prints of educational films were available in film libraries operated by educational institutions (Brown & Norberg, 1965). While these developments were impressive, it was Russia's launch of the Sputnik 1 satellite in 1957 that really began the national push into educational media. Shocked by the Soviet lead in the space-race, Congress passed the National Defense Education Act (NDEA) of 1958. Among other things, this law provided for grants and contracts to research more effective uses of TV, radio, motion pictures and audiovisual aids for educational purposes (Kinder, 1973).

The NDEA and similar federal legislation which followed helped to make the 1960s another period of tremendous growth for the various forms of educational media. These included closed-circuit and broadcast ETV, random-access video systems, and even the early use of satellites for program distribution (Wood & Wylie, 1977). It looked like the flood of funding for educational media would never stop. But in 1967, the direction of educational media and ETV took a sharp turn. That was the year President Johnson signed the Public Broadcasting Act into law. Although the new law contained funding for a comprehensive study of educational telecommunications, the net result of the Public Broadcasting Act was to shift public and private funds from various educational media programs into the Corporation for Public Broadcasting.

While all of this was going on in the area of educational media and ETV, another quiet revolution had begun in the area of non-commercial media. By the mid-1960s, a growing number of government, corporate, and private organizations were employing media specialists to produce a wide variety of media products. These organizations included the U.S. Department of Agriculture, the U.S. Information Agency, the American Red Cross, the American Dental Association, and the General Motors Corporation to name only a few (Brown & Norberg, 1965). All through the 1950s and

1960s, these non-commercial media departments primarily used 16mm film as their production standard. It was not a particularly expensive medium and multiple copies of a program could be easily distributed (Richardson, 1992). "Corporate" media was born.

The big step for corporate media came one year after the Public Broadcasting Act, when Sony demonstrated its first three-quarter inch U-Matic video cassette. Although Sony's video cassette system was designed for the consumer market, it never made it there. By the time color U-Matic systems finally started shipping in 1972, they were an instant success with the industrial and institutional markets (Brush & Brush, 1981). Corporate, institutional, and government use of video has dramatically increased from that point on.

While video was perhaps the most powerful communications medium available to the modern organization, it was only one of many tools. Other media technologies that have been used in organizational communications include computer graphics, film, slides, overheads, still photography, multi-media, and video teleconferencing.

The use of all forms of organizational media has steadily increased since 1972 for a variety of reasons. During the 1970s, the growing size of American corporations and the early introduction of computers into the workplace created an increasing need for training products. Technological developments in the areas of automated photo processing and computer typesetting made these media forms accessible to more organizations. During the 1980s, a dramatic increase in the use of personal computers and the wide-spread restructuring of corporations greatly increased the complexity of organizational communications. Managers were faced with a multitude of communications problems: communications with government and regulatory bodies; with top executives, board members, stockholders, and employees; with dealers and

customers on an international scale; with public advocacy groups; with the press; and even with other managers around the world (Marlow, 1989). The organizational uses of media grew in proportion to the increased complexity of corporate communication. Table 1 below illustrates the growth of media products used by business, industry, government, health, and religious organizations during this period (Hope, 1987):

Table 1.

Organizational Spending for Slides, Video, and Film: 1975 -- 1985[a]

Media Type	(1975)	(1985)
Slides	$644 million	$5.3 billion
Video	$220 million	$1.6 billion
Film	$0.5 billion	$0.5 billion
	$1.4 billion	$7.4 billion

[a]Adjusted for inflation.

Organizational use of media continues to grow today as technology develops, the price of equipment drops, and the quality improves (Richardson, 1992). Annual non-broadcast video expenditures have now surpassed the $5 billion mark. There are well over 8,500 American organizations using video and other media for training, employee communication, marketing, and public relations (Griffith, 1992).

The current trend in organizational media is for production processes to become more electronic and computerized. Increasing competition for scarce resources is causing organizations to look for better ways of producing the communication products they need. A movement toward consolidating organizational media production can now be seen. Through the rest of the 1990s, "media production activities, whether graphic,

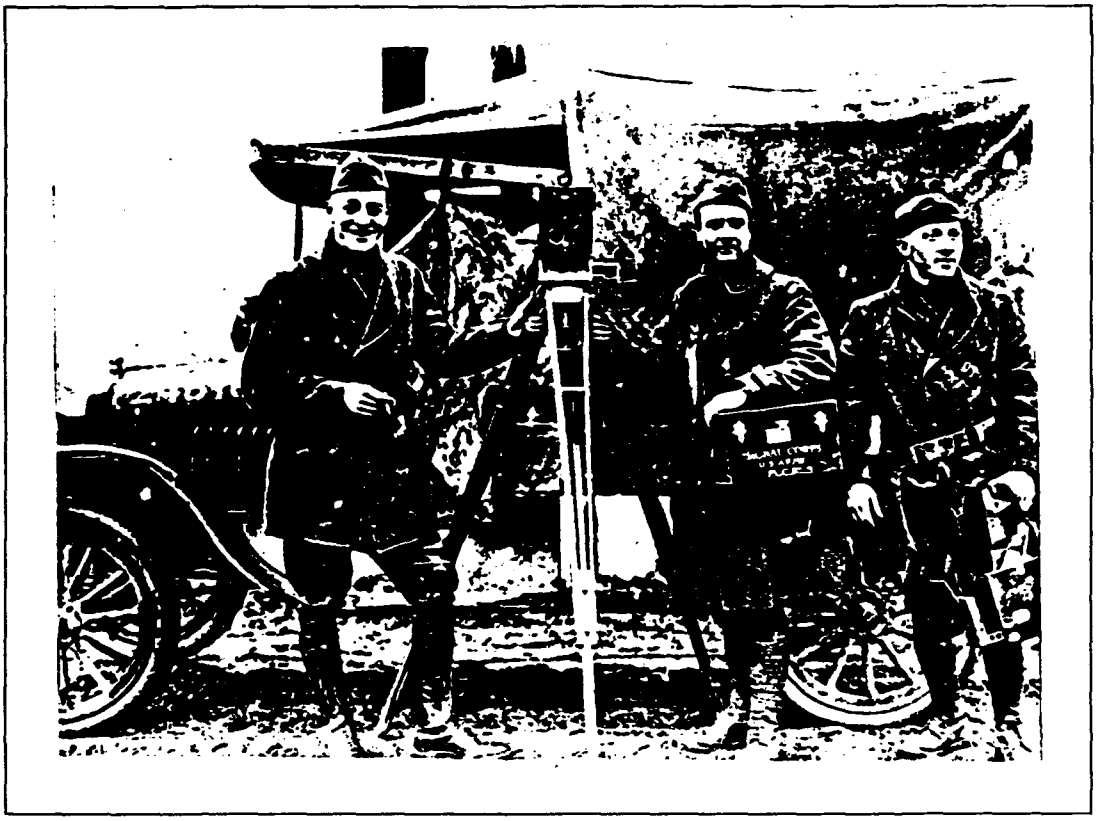
photographic or electronic, will have electronic/computer technologies in common. In turn, it should become obvious these production activities belong together." (Marlow, 1989, p. 165). As organizational media activities become more electronic and computerized, they may find they have more in common with telecommunications and data processing than with marketing, training, or corporate communications. It is possible that corporate media departments will begin moving away (organizationally) from their traditional homes and toward other areas with which they have more technology in common.

History of U.S. Air Force Visual Information

To gain a better understanding of the organizational context of the electronic imaging center (EIC) concept, we should first examine the historical development of visual information systems in the Air Force. The first use of motion picture film by the U.S. government took place in 1908 when the Department of Agriculture purchased a camera to film test flights of the plane made by the Wright brothers for the Army Signal Corps (Film Council, 1983). By the time America entered the first world war, the Army signal corps had established combat photo units equipped with movie cameras and "Graphflex" box cameras. These units used model "T" Ford trucks as darkrooms, transportation and even living quarters in an emergency. Figure 2 below shows the 1st Division Photo Unit with some of its equipment.

Figure 2.

1st Division Photo Unit during World War I



In the years after the war, sound was added to the technology of motion pictures. In 1934, the Army Air Corps purchased two sound-motion picture cameras. This initial procurement led to the establishment of training film production units at Chanute Field, Illinois, and Wright Field, Ohio ("Historical Support," 1944). Film was also used by the U.S. Army during the 1930s to help keep the public informed and motivated to support the military. (Army Regulation 600-700, 1935).

By the beginning of Word War II, the Air Corps had a well developed photographic establishment organized primarily around the mission of photo reconnaissance. Every air base laboratory had one officer and fourteen enlisted

technicians assigned to provide base photo services and wartime laboratory processing (Memorandum, 1943). Other specialized photo technicians provided bombing assessments and service of the gun-sight aiming camera for fighter aircraft. A technical training school was soon established at Lowry Field in Denver, Colorado, to train Air Corps members in the science of motion picture photography, still photography, and photo processing.

By 1942, the Army Air Corps had established a substantial capability to produce training and informational films. The Wright Field production facility turned out aircraft maintenance training films while the Army Air Forces School of Applied Tactics at Orlando, Florida, wrote production scripts. The newly activated 1st Motion Picture Unit in Culver City, California, produced flight training films and movies on other related subjects. The 1st Army Air Forces Combat Film Detachment in New York City provided post-production services to meet operational and public relations requirements using the Air Force's combat camera footage shot during the war ("Historical support," 1944).

In addition to training film production, the Army Air Corps created and deployed 14 Combat Camera units assigned to the numbered Air Forces (Combat camera memorandum, 1943). Each combat camera unit was staffed with eight officers and 22 enlisted men. A few combat camera units were equipped with the "experimental" 16mm format movie cameras. Geographically, there were four combat camera units deployed in the South Pacific, three in Europe, three in the Mediterranean theatre, and one for training replacements in the U.S. (Table of organization and equipment 1-7-08, 1944). The entire combat camera establishment was quickly disbanded at the end of World War II.

After the Air Force became a separate service in 1947, there was a significant expansion in the use of technical and special-purpose photography. This was primarily in the area of research and development, atomic testing, and optical instrumentation to record test activities. A well equipped film production center called the "Lookout Mountain Laboratory" in Hollywood, California, was established during this period to support the Pacific and Nevada Atomic tests ("Study," 1950).

When the United States entered the Korean conflict in 1952, the Air Force realized it needed an organizational structure to manage its media resources and to restore combat camera functions lost after World War II. The result was the formation of the Air Photographic and Charting Service (APCS) in April 1952. The concept was to operate "cradle-to-grave" management over all media resources. The APCS managed Air Force combat camera operations, motion picture production at Orlando, Florida, the central film library at Saint Louis, Missouri, and the film depository at Wright Field, Ohio. In addition, they also managed mapping and charting services for the Air Force until 1962 when these functions were split off and APCS became the Air Photographic Service (APS). (General Order 332, 1952).

The Air Force's use of various forms of media continued to expand even after the end of the Korean conflict. A military build-up for the Cold-War helped base level operations to become more formalized and structured. During this time, the operations and training divisions (which "owned" base photo labs) took over most of the "housekeeping" duties of base management. Most of these directorates of operation and training (DOT) also managed the base film library. Base film libraries had been established because of the Air Force's large investment in training films. The process was for movies to be issued from the central film library and then controlled, cleaned,

and maintained by a local base film library. These film libraries also carried a stock of projectors for local Air Force units to check out and use with media programs. At about this period of time, base comptroller activities began forming graphic divisions to help them produce their numerous budget briefings. These graphic shops slowly grew in size and capability, until eventually their services were extended to other base functions as well (R. H. Zigler, personal communication, May 22, 1993).

In the meantime, the Air Photographic and Charting Service (APCS) continued to meet the Air Force's rising demand for photo documentation and motion picture production. APCS entered the realm of television training by constructing three fully equipped television vans and placing them near Air Force training development centers at Kelly AFB, Texas, Carswell AFB Texas, and Hill AFB, Utah. Television production studios were also built at the Orlando and Lookout Mountain facilities. By 1965, the APCS had 5 squadrons and 30 detachments world-wide. When America's involvement in the Vietnam increased in 1966, the Air Force decided it needed a more extensive and coordinated audiovisual effort to support the war. The APCS was renamed the Aerospace Audiovisual Service (AAVS) in 1968 and given central management control over all photographic, graphic art, video technology, and armament film processing (airplane gun-camera film) in Southeast Asia (Anderson, 1986).

Meanwhile, back in the continental United States, base photo labs had stayed under base operations and training divisions and graphics were still under the comptroller. At several of the Air Force's large training bases, presentation services were added to manage the many projection rooms. In 1968, the central film library, the motion picture depository, and most Air Force film production services were consolidated at Norton Air Force Base, California. The Norton activity was under the

command of the Aerospace Audiovisual Service and included a huge central processing plant for developing everything from 35mm motion picture film to 35mm color slides (R. H. Zigler, personal communication, May 22, 1993).

In 1972, the CBS television network aired a documentary called "Hollywood on the Potomac" which made the public aware of the millions of dollars being spent by the Department of Defense on audiovisual production. What followed was a painful, but healthy movement to consolidate media operations, cut costs, and stop uncontrolled production. For instance, a study by Air Force audiovisual functional managers found there were no less than 30 separate graphics shops in the Pentagon--13 in the Air Force alone. Similar redundancies were discovered at many Air Force bases. In an attempt to eliminate waste and get things under more control, the Air Staff created the Base Audiovisual Center (BAVC) function in 1975. This concept called for the consolidation of all base graphics, photo lab, presentations, and film libraries under a single base audiovisual manager. This change was slow to be accepted Air Force-wide, but eventually helped to bring about greater physical consolidation and standardization of audiovisual assets. In turn, the consolidation allowed some now larger BAVCs to justify buying new "mini" automated film processors and photo typesetters. A few locations also bought and tested automated black and white print processors (D. C. Anderson, personal communication, May 22, 1993).

With the successful consolidation of base audiovisual services and the now well-developed expertise of the Aerospace Audiovisual Service (AAVS), the Air Force media community was poised for a decade of technological and organizational innovation. This decade began with Air Force media leaders convincing the Secretary of Defense to establish a defense-level agency to manage several key audiovisual

functions. In October 1980, the Defense Audiovisual Agency (DAVA) was formed to consolidate all Department of Defense (DoD) motion picture production and the media archives (depository). The new agency was formed at Norton AFB, California, in what had been the AAVS headquarters building. While DAVA was able to consolidate the DoD media archives, it proved to be less effective than originally hoped. Most of the DAVA functions were eventually converted to contract operations and the agency was disbanded in 1985.

In the meantime, all internal military media functions (including base audiovisual services) were renamed to "visual information" by an agreeemnet between the Department of Defense and Congressional staff members. The term visual information helped to distinguish military media services from the film production functions performed by DAVA. Despite giving up their large facility at Norton AFB, the Air Force had retained their in-house combat camera, TV production, and base VI service functions.

The new "division of labor" between DAVA and Air Force media actually helped Air Force media leaders to focus on modernizing the functions left in their control. This process started by converting combat camera assets from 16mm film to Betacam "camcorder" systems. Combat camera units were outfitted with the latest high-quality television equipment to increase their responsiveness and flexibility. Interactive video disc mastering facilities were established at Hill AFB, Utah, and Keesler, AFB, Mississippi. Regionalized Air Force TV production facilities were all upgraded to computer-controlled editing with 1-inch helical machines or component-video Betacam equipment. For the base visual information centers, new automated film processors and graphic copy cameras replaced tedious manual systems. Most of the Major Air

Commands (MAJCOMs) purchased computer graphic systems for their base VI centers to be used for producing 35mm and viewgraph briefing slides. Modern VHS and 8mm video tape player/recorders were purchased to replace aging 16mm film projectors. An Air Force-wide procurement of Noritsu "1-hour photo" processors finally upgraded every base photo lab to making color prints. Everywhere you looked, new technology had been applied to increase the timeliness and quality of Air Force media.

On the organizational side of the 1980s, there was further movement toward, and then away from centralization. The Aerospace Audiovisual Service picked up responsibility for managing base visual information services for several large MAJCOMs. These included the Pacific Air Forces in 1980, Air Forces Europe in 1983, and the Strategic Air Command in 1989. In a move that foreshadowed things to come, the Air Staff level functional management of Air Force visual information moved from the operations and plans area to the computers and communication area in 1985. In 1987, an Air Staff directed functional management inspection discovered that as many as 16 different computer graphics systems were in use at base VI centers--none of which could interface with the other. This inspection report helped to stimulate even more interest in standardizing electronic media systems at base VI centers. One eventual result of the interest in standardizing and streamlining was the conversion of the central film library to one-way distribution of VHS and 8mm tapes instead of "bicycling" copies of 16mm motion pictures.

The Air Force effort to introduce and standardize electronic technologies reached its culmination in 1989 when the commander of the Aerospace Audiovisual Service (AAVS) proposed converting all base visual information services to electronic imaging systems. This initiative, known as the electronic imaging center (EIC) concept,

was the catalyst for our present research study. However, the centralization movement of the 1980s ended abruptly in 1992 when the Air Force decided to downsize AAVS and focuss it more on the mission of combat camera. As part of this restructuring, AAVS was renamed the Air Combat Camera Service (Air-CCS) and stripped of all of its base visual information (VI) assets.

Base VI functions were moved into local communication squadrons much like the Air Staff level functional management of VI had been transferred in 1986. These "comm" squadrons were responsible for managing all communications, data processing, and computers on their base. Ironically, the decision to move base VI services to communication squadrons had been made in-part because of the increasing use of computers and electronic systems in base visual information shops. This was consistent with the 1985 Air Staff decision to move the headquarters VI office into the communication and computers area.

Although the electronic imaging center (EIC) concept is no longer an Aerospace Audiovisual Service program, it has been picked up as an Air Force initiative for base level media services. The introduction of new electronic imaging systems into base VI centers is seen as vital to meeting future Air Force media requirements. However, the question of just how to implement the proposed technological change is now a matter of further review.

New Technology and the Media Professional

High level Air Force visual information (VI) leaders are looking at electronic imaging technology to improve efficiency and cut costs. Base level VI professionals who will be asked to use these new imaging systems are not strangers to new technology or change. They have seen the wholesale introduction of automated photo processing and graphic imaging into their work place within the last few years. They have also witnessed the restructuring of their command functions and the combining of two separate VI specialties into one in just the last 12 months.

The proposed electronic imaging center (EIC) concept seeks to bring about more technology-driven change to the Air Force media work place. The EIC relies on powerful new technologies to radically transform the way people work. This concept seems to imply that the more powerful a technology is, the more it is like magic. Unfortunately, where magic operates people don't usually look very carefully at what is going on (Bikson & Eveland, 1986). Fortunately, in the face of almost constant change, Air Force VI managers are starting to look more closely at these new technology tools. VI managers are rediscovering the value of skillfully managing change rather than relying on technology to work its magic.

Over the last 15 years there have been many studies of the impact of introducing new technology into industrial, office, and R & D settings. In order to better understand the impact of introducing the EIC concept into Air Force base VI centers, we should examine the results of some of these studies

New Technology and Job Satisfaction-Job Diversity

Much of the research on the introduction of new technology into the workplace has looked at the impact of information technology in the office, engineering center, and shop floor. Nevertheless, the results of these studies can be applied in a general way to the introduction of electronic imaging into the work environments of most Air Force VI centers. One of the key variables common to most of these studies has been the extent of use of information technology (IT) by those people being studied. That is to say, in studying the effects of IT, people who used IT were compared to people who used IT less, or not at all (Attewell & Rule, 1984). The strongest correlation these studies have found was the impact of the amount of information technology used on job diversity (Turner & Karasek, 1984). This positive relationship between extent of use and job diversity has been substantiated by other IT studies as well (Medcof, 1989; Turner, 1985). For people who used information technology, Lucus (1986) noted that the way IT effected job diversity became a significant determinant in the overall success of new systems in organizations. In other words, if employees perceived that a new technology had increased their job diversity, they were more likely to continue to use and accept that technology. Turner and Karasek (1985) also found that increased job diversity from using IT had a positive effect on work outcomes such as job satisfaction, absenteeism, and productivity. Turner (1985) confirmed this proposition by noting that the use of information technology can increase task characteristics (job diversity) and thereby effect job outcomes (job satisfaction). This model proposes that increased job diversity (which results from using new technologies) leads to other positive work outcomes such as increased job satisfaction and productivity (Griffen, 1987).

New Technology and User Attitude Toward Change

In a series of case studies, Mankin, Bikson, Gutek & Stasz (1988) looked at the introduction of multifunction office information systems connected to large corporate data bases. Identical computer systems were installed into several similar office settings and the results measured after a year. They noted that for some companies, the computer system had meant dramatically improved employee satisfaction, motivation, and performance. For the employees of other companies, however, the computer had created a decidedly unpleasant work situation reflected in low morale and high turnover. Since the underlying technology was the same, they ruled that out as the deciding factor. They then examined the process used by each company to introduce the new computer system. What they discovered was that a positive employee orientation toward change was the overall best predictor of implementation success (Mankin, et. al., 1988). There is also some evidence that employees who use new technologies develop a more positive attitude toward future change. A study by Medcof (1989) concluded that there was a positive correlation between increased use of a technology and overall user acceptance of new technology. This suggests that if a new technology is used and accepted, employees may be more disposed to accept other forms of technology.

New Technology and Training Issues

Research suggests that most information system failures stem from a lack of user acceptance rather than poor technical quality (Nelson & Cheney, 1987). Training in terms of new technology is used to reter to formal efforts to transfer the required knowledge about new systems to those who will use them. Culnan (1985) pointed out

that whenever a new information technology is first introduced, end users require a large amount of training and support in order to become comfortable with the system. Other researchers have found a positive correlation between technical training and end user acceptance of new systems and technologies (Igbaria, Pavri, & Huff, 1987; Nelson & Cheney, 1987).

Management theorist Schien (1961) described training as an unfreezing, moving, and refreezing process. Unfreezing was necessary because the end user becomes replete with ingrained habits of feeling, thought, and action. To change an end user through training, his/her normal work habits first had to be questioned and disturbed, or *unfrozen.* Trainers could do this by focusing attention on things the user could not do with existing systems. The trainer then introduced other methods that let users try new systems, that is *moving.* If users found the new systems and ways of doing things more useful, the individual would establish personal continuity by *freezing* the new behavior. This *unfreezing, moving,* and *freezing* process was thought to be most important whenever a new technology was significantly different in its work process than existing systems.

Culnan's (1985) study of the impact of training on user acceptance, found that training could enhance user acceptance of new technology by improving the user's perception of how easy the new technology was to use. Other experts agree that appropriate training is critical to the successful implementation of new technology. They point out that new systems require greater cognitive skills and that case studies of successful organizations show that they create a positive "training culture" to help employees adapt (Bainbridge & Quintanilla, 1989; Martin & Scribner, 1991).

New Technology and Participatory Management

One of the leadership goals of the Department of Defense (DoD) is to create a management "culture" of total quality management (TQM). The desired TQM culture emphasizes improving the *process* of creating products rather than simply focussing on the products themselves (TQM master plan, 1988). This management goal hopes to involve everyone in working toward improved services, weapon systems, and military effectiveness. Air Force managers are instructed in TQM seminars to involve all of their people in improving the work processes they manage ("AF quality, "1990). The use of TQM in Air Force visual information activities has encouraged VI specialists to help improve the quality of VI services by participating in decision making and planning. This process is now seen as the key to getting the most benefit from VI systems.

Technology researchers Mankin et al. (1988) asserted that the process by which a new technology was introduced into the workplace affected user acceptance and productivity. They found that a participatory management style was positively correlated with implementation success. Morrison (1989) suggested that successful companies actively seek the participation of their employees in implementing new technology. These successful companies encourage their employees to help them find the points of greatest resistance to new systems, rather than the least. Instead of pretending that power issues, rumors, and frustrations don't exist, successful managers seek out problems and resolve them with the full participation of everyone involved.

A study by Baroudi, Olsen, and Ives (1986) confirmed that the procedures used by management to implement new technologies have a direct impact on the acceptance and use of that technology by employees. They found that user

involvement in the planning process for information systems increased both system usage and satisfaction.

Air Force visual information (VI) managers should know intuitively that no new technology can be successful unless their people use and accept it. Visual information Managers need to develop implementation strategies that will involve VI professionals in the process of using electronic imaging systems to improve service and increase efficiency. The way they introduce these new technologies into the workplace will be critical to the success or failure of the implementation process.

Studies of the introduction of information technology into the workplace have suggested that these systems increase employee job diversity and job satisfaction when they are successfully implemented. Air Force VI professionals must develop a positive attitude toward technological change in order to reach the maximum benefit of new imaging technology. One way to help develop positive attitudes is for base visual information units to use a participatory management style and involve all users in the implementation process from the earliest stages.

Finally, media organizations must not overlook the importance of good training to the overall implementation process. With proper training, the systems will be easier to learn and use, employees can more quickly obtain increased job diversity, and the overall productivity will increase.

RESEARCH METHODOLOGY

Overall Research Question

How does using new imaging technology affect a media professional's self-reported job satisfaction, job diversity, and their attitude toward change in the workplace?

Research Sub-Questions

(1) Do media professionals who use more electronic imaging technologies have greater job diversity, job interest and job satisfaction than comparable media professionals who use them less or not at all?

(2) Do media professionals who use more electronic imaging technologies have a more positive attitude toward change than comparable media professionals who use them less or not at all?

(3) Does the quality and amount of training provided for new systems affect a media professional's acceptance of new technology?

(4) Does a participatory management style increase user acceptance of electronic imaging technologies more than using an autocratic style?

(5) Does the "user friendliness" of new electronic imaging systems affect the acceptance of that technology by media professionals?

The Population

The population studied for this research project was media professionals working at Air Force base visual information (VI) centers. At the time of the study, there were 98 base VI centers world-wide in the U.S. Air Force (several were scheduled to be closed in 1993). Each of these centers was staffed and equipped to provide consolidated graphics, photo, and presentations support to the local base organizations. Organizationally, visual information centers are under the day-to-day operational command of the base communications squadron. Base VI centers also report to a headquarters-level VI management office located at their parent Major Air Command (MAJCOM). This office oversees the corporate management of all visual information activities including TV production, video teleconferencing, combat camera, and base VI centers.

Media professionals who work at Air Force base VI centers can be divided into three distinct groups. These are: (1) visual information specialists, (2) still photographic specialists, and (3) visual information senior supervisors. Each group performs a separate media function and has their own unique training and skill requirements. The visual information specialists are responsible for both the creation of graphic products and all presentation services. Their job may range from creating

briefing charts, to producing signs and illustrations, to working with projectors, conference centers, and command briefings. The still photographic specialist job can run anywhere from studio photography, to photo documentation, to mixing of chemicals, to processing and finishing the various photographic material. Visual information senior supervisors are high-ranking non-commissioned officers and civilians who have been promoted up from a related visual information career field. Senior supervisors are responsible for managing the day-to-day operation of the base VI center. The study population consisted of 1,265 (total) Air Force visual information professionals in the three groups mentioned above.

Method of Sample Selection

The researcher obtained the research sample by selecting 16 base visual information centers by location. Four of these bases were selected as a purposive sample due to their intensive use of new imaging technologies. These locations (Hurlburt AFB, Barksdale AFB, Elmendorf AFB and Eielson AFB) had participated in the 1991 test of the electronic imaging center (EIC) concept mentioned earlier. Under this program, each test location received up to $500,000 dollars of new electronic imaging equipment, training and installation. Since completing the test in December 1991, these four locations have continued to use electronic imaging systems for producing visual information products and services. This intensive use of EIC systems made them a potentially good source for obtaining survey respondents who use many of the new electronic imaging systems.

The researcher randomly selected the remaining 12 bases from among those using mostly traditional imaging technology. These 12 locations were picked from among the 29 base VI centers of the Air Combat Command (ACC) using a random number table. The researcher limited the selection pool to only ACC bases for three reasons: (1) Overall, ACC base VI centers use more traditional imaging systems and procedures than most other Air Force commands. This made them a potentially good source for obtaining survey respondents who only a few of the new electronic imaging systems. (2) ACC has a greater number of continental U.S. bases than any other A.F. command. This allowed for a more random selection process--thereby enhancing the validity of statistical research. (3) The use of a single command as a source for 13 of the 16 locations (including EIC test base Barksdale AFB) helped simplify the lengthy Air Force survey management and approval process. Since the researcher was required to obtain sponsorship from the parent MAJCOM of every base used for the survey, this selection method limited the commands to just three. Table 2 contains a list of the base VI centers which were selected for the sample.

Table 2.

List of Base VI Centers Included in the Study

Location	MAJCOM
Barksdale AFB, LA	Air Combat Command (ACC)
Beale AFB, CA	Air Combat Command (ACC)
Davis-Monthan AFB, AZ	Air Combat Command (ACC)
Eielson AFB, AK	Pacific Air Forces
Ellsworth AFB, SD	Air Combat Command (ACC)

Location	MAJCOM
Elmendorf AFB, AK	Pacific Air Forces
Grand Forks AFB, MD	Air Combat Command (ACC)
Hurlburt Fld, FL	AF Special Operations
K I Sawyer AFB, MI	Air Combat Command (ACC)
Langley AFB, VA	Air Combat Command (ACC)
Luke AFB, AZ	Air Combat Command (ACC)
McConnell AFB, KS	Air Combat Command (ACC)
Nellis AFB, NV	Air Combat Command (ACC)
Offutt AFB, NE	Air Combat Command (ACC)
Seymour Johnson AFB, NC	Air Combat Command (ACC)
Shaw AFB, SC	Air Combat Command (ACC)

Limitations of the Survey Sample

The researcher delimited the study to only visual information (VI) professionals working in U.S. Air Force base VI centers. One advantage of this delimitation is that Air Force visual information centers are standardized, have stable workloads, and are manned by professionals having similar characteristics. Air Force VI professionals share the same career fields, technical schools, and chain of command. It was, therefore, assumed that objective data could be collected from this population using a

survey instrument. One drawback of delimiting the survey to Air Force base VI centers is that they are not commercial profit-making enterprises. This meant there was a lack of generalizability to commercial media organizations. However, it may be possible to generalize the study results to non-commercial, corporate, and governmental media professionals.

Another delimitation is that only 16 VI centers were selected out of 98 Air Force locations. The researcher found that 340 out of the possible 1,265 media professionals (or 27%) were currently assigned to those 16 locations. Because Air Force media centers are standardized, it was assumed that a valid and representative sample could be made. The researcher received 175 surveys from the participating locations (a 52% return-rate). This represented 14% of the study population.

Another delimitation of the study is that it focussed only on those specific new imaging technologies which were part of the electronic imaging center initiative of 1991 and 1992. The selected EIC technologies were designed to integrate the traditional functions of audiovisual production into an electronic computer-based network of imaging systems. The total integrated nature of this technology initiative was expected to have a profound effect on job specialties, skill utilization, employee training and organizational functions ("Aerospace Audiovisual," 1990). It was this effect that the researcher hoped to measure and then make generalizations about.

A limitation of the study is the recent reorganization of Air Force visual information (VI) centers from the a number of functional areas into the base communication squadrons. The effect of this change on Air Force VI personnel morale could not be controlled for in this study. Another limitation is the amount of uncertainty

caused by continued Air Force downsizing, base closures, and force reductions. It was assumed that these changes would not adversely affect the study of the impact of new imaging technology.

The Survey Instrument

The survey instrument was designed to obtain each respondent's use and acceptance of the EIC technologies using an interval measurement system. The interval level data was needed to allow the researcher to group respondents by percentile. Percentile clustering served the mathematical purpose of dividing respondents into high-tech/low-tech (use of EIC) and high-acceptance/low-acceptance (attitude about EIC) groups. These groups could then be used to make comparisons with independent and dependent variables. Other interval-level data questions measured the user friendliness of EIC systems in-use, years of experience, rank, and number of people the respondent supervised.

In addition to interval-level data, the survey collected ordinal data on the respondent's reported job satisfaction, job diversity, and technical training. Other ordinal-level survey questions attempted to determine the management style the respondent used or was subject to at his/her location. Several other questions were designed to obtain ordinal data on the respondent's attitude toward change and their educational level.

Nominal-level questions used to obtain important demographic data about each respondent included: the media professional's job specialty, gender, and unit. The researcher placed a location code on the first page of each survey so that every

response could be traced to a specific unit and the overall returns could be tracked. Each Air Force base VI center point of contact was informed that the researcher would track survey responses by location using a hidden coding system.

The survey instrument was divided into four main parts (see the survey example--appendix A). Part one asked the respondents questions about their job, their impression of changes to their work environment, their outlook for the future, and their assessment of the management style used at their job. Part two asked respondents to note the specific EIC technologies they used, any training they received for them, and to answer six questions assessing their perceived "ease of use." These six ease of use questions were developed by Davis (1989) to measure end-user acceptance of data automation technology based on the "perceived user friendliness" of these systems. The researcher adapted these questions to measure the perceived user friendliness of electronic imaging systems. Part three of the survey asked participants to document their opinion about the future implementation of the electronic imaging center concept. This section included another six questions developed by Davis (1989) which were designed to measure end-user acceptance of data automation technology based on "perceived usefulness." The researcher also adapted these six questions to measure the respondent's perception of the potential benefits of implementing the EIC concept in their workplace. Part four of the survey obtained demographic data on each respondent.

Before the surveys could be officially administered, the researcher had to obtain permission from the Air Force to conduct research using government employees. A request for survey approval was sent to the Air Force Institute of Technology (AFIT) in

January 1993 (see appendix C). The survey approval request included the survey, a draft cover letter, suggested points of contact, and details of the methodology to be used in the research. Formal approval was received from AFIT and the Air Force Manpower Center (AFMPC) in late February 1993. The survey instrument itself was approved as-written with no recommended changes and given a survey control number (SCN#93-22).

Once permission was received to proceed, the correct number of surveys were prepared for each of the 16 selected base VI centers. The surveys were assembled into "kits" by stapling them together with a cover letter and a postage-paid return envelop. The cover letter explained the importance of the research and encouraged each individual to participate (see the cover letter example--appendix B).

Data Collection

In addition to getting approval for the survey instrument, the researcher was also required to obtain command sponsorship from each Major Air Command (MAJCOM) whose personnel would be surveyed. This was done with the cooperation of the Headquarters, United States Air Force Visual Information Functional Manager (AF/SCMV). The researcher sent a written request for assistance to HQ USAF/SCMV in January 1993. They in-turn sent letters to the three commands asking for their sponsorship of the research project. By the end of February 1993, all three MAJCOMs had agreed to sponsor the research (see appendix D). Command sponsorship granted the researcher permission to call the 16 selected locations, obtain a point of contact, and collect surveys from the appropriate personnel.

On March 2nd, the researcher telephoned all 16 locations to obtain a point of contact and the current number of assigned personnel. In every case, the VI center senior supervisor agreed to be the official point of contact. Once the exact number of VI personnel at each location was determined, the finalized surveys (with the unit designator code) were sent along with a letter of transmittal to each location on March 5th (see sample transmittal letter--appendix E). A follow-up telephone call was made to all 16 points of contact on March 12th. The purpose of the follow-up call was to confirm receipt of the surveys and see if there were any problems or questions.

Several small problems were easily resolved over the phone. This included one point of contact who had been suddenly replaced. The replacement supervisor did not know that the survey had been approved by the Air Force or sponsored by his Major Command. A final follow-up phone call was made to every location on March 26th. During this call, the researcher informed each point of contact of the exact number of surveys which had been received from their unit thus far. Units with low return rates were specifically asked to encourage their people to respond. All points of contact were asked to remind people of the April 2nd deadline for mailing surveys back to the researcher. This last phone call helped to significantly raise the final response rate. In all, the researcher documented 73 long-distance phone calls made during the process of preparing for and conducting the survey research.

At each study location, the surveys were passed out to VI personnel by their senior supervisor (the point of contact). The survey itself was self-administered. Each respondent then placed their survey in a sealed postage-paid envelop and mailed it back to the Cronkite School. Participation in the survey process was entirely voluntary.

Participants were assured that information collected from individuals would not be identifiable in the final report. Of the 340 surveys mailed out, the researcher received 175 responses for a return rate of 52%. Table 3 below shows a comparison of the study population and the sample obtained in this study:

Table 3.

Comparison of the Study Population vs. the Sample Results

VI Specialty	Number in Population	Percent of Population	Number in Sample	Percent of Sample
VI Specialist	640	51%	89	53%
Still Photo Specialist	580	45%	60	36%
VI Senior Supervisor	45	4%	18	11%
Total =	1,265	100%	167[a]	100%

[a]Actual surveys received = 175 -- (7 did not list their specialty).

Data Analysis

Responses were tabulated and entered into a data matrix using the Statistical Program for the Social Sciences (SPSS). The researcher used the coding scheme shown in appendix F to enter the data. This data file was then printed out and checked for coding accuracy. The researcher began the analysis by running then printing the frequencies for every survey question. This allowed for a check of sample parameters while also locating coding errors missed earlier.

To simplify the analysis of the data, several interval level responses were collapsed into ordinal groups. This included the categories of "years of visual

information experience" and "number of people supervised." The EIC usage scores were also collapsed into groups by using percentiles to mathematically divide them into two parts. This allowed the researcher to compare the high-tech users to the low-tech users. Having entered the data into SPSS, the researcher then ran the appropriate crosstabulation of variables to look for correlations. These "crosstabs" were used to examine how the survey data might help answer the main research question and the sub-questions. The next section of this report will provide the reader with the results of the survey and these crosstabulations.

PRESENTATION AND ANALYSIS OF DATA

The presentation of survey data is divided into two major sections. The first section deals with the survey questions and the overall sample results. Each survey question is listed along with the rationale for using the question in the study. The overall sample frequencies for that question are then displayed in a table. A brief written analysis of each of the sample frequencies gives some general observations and also includes the confidence interval for generalizing the results to the entire population.

The second section of the survey data deals with each of the research questions and provides several statistical comparisons of the variables which apply to that question. The data is presented in charts or tables to visually depict the association being studied. A brief written analysis explains each correlation of dependent and independent variables. This analysis includes measures of significance and correlations to help answer the research questions. Only those comparisons which were statistically significant ($p=<.05$) are detailed in this section.

Data Presentation Section 1: the Survey and the Sample Results

Survey Instrument Questions 1 to 8

These survey questions asked the respondents for their opinions about their job; their impressions of change to the working environment; their outlook for the future; and their assessment of the management style used on their job.

Questionnaire Item 1

The Item -- How would you rate your satisfaction with the job you are now doing in Visual Information?

(a)_____very satisfied?

(b)_____satisfied?

(c)_____dissatisfied?

(d)_____very dissatisfied?

Rationale -- The purpose of this question was to assess each respondent's level of satisfaction with their job. This measurement allowed the researcher to examine the relationship between job satisfaction and other variables.

Results -- The overall sample frequencies are listed in Table 4 below:

Table 4

Frequencies for Job Satisfaction

Value	Category	Respondents	Percent
1	Very Satisfied	76	43.4%
2	Satisfied	87	49.8%
3	Dissatisfied	10	5.7%
4	Very Dissatisfied	2	1.1%
M = 1.65	N =	175	100%

Analysis -- Over 93% of the respondents said that they were satisfied or very satisfied with their job. This suggests that the visual information units sampled are providing a good overall working environment for their people. The 95% confidence interval for this question is +/- 7.4% (85.6% - 100% of all Air Force VI personnel are satisfied or very satisfied with their job).

Questionnaire Item 2

The Item -- When you consider the variety of tasks you perform in your present job, would you say that these tasks are:

(a)_____very diverse?

(b)_____diverse?

(c)_____similar?

(d)_____very much alike?

Rationale -- The purpose of this question was to assess the job diversity of each respondent. This measurement allowed the researcher to examine the relationship between job diversity and other variables.

Results -- The overall sample frequencies are listed in Table 5 below:

Table 5

Frequencies for Job Diversity

Value	Category	Respondents	Percent
1	Very Diverse	41	23.5%
2	Diverse	91	52%
3	Similar	37	21.1%
4	Very Much Alike	6	3.4%
M = 2.05	**N** =	175	100%

Analysis -- Over 75% of the respondents said that they considered their jobs to be diverse or very diverse. Approximately 25% of the respondents found their job tasks to be similar or very much alike. This suggests that about one quarter of the sampled Air Force VI personnel are required to accomplish the same job-tasks day-in and day-out. The confidence interval for this question is +/- 7.4% (68% - 82.8% of all Air Force VI professionals think their jobs are diverse or very diverse).

Questionnaire Item 3

The Item -- Consider the nature of the projects you have accomplished in your present job. Overall, would you say they have been:

(a)_____very interesting?

(b)_____interesting?

(c)_____dull?

(d)_____very dull?

Rationale -- The purpose of this question was to assess how interesting each respondent thought his or her job was. This measurement allowed the researcher to examine the relationship between how interesting someone thought their job was and other variables.

Results -- The overall sample frequencies are listed in Table 6 below:

Table 6

Frequencies for Job Interest

Value	Category	Respondents	Percent
1	Very Interesting	52	29.7%
2	Interesting	102	58.3%
3	Dull	18	10.3%
4	Very Dull	3	1.7%
M = 1.84	**N** =	175	100%

Analysis -- 88% of the respondents said that they considered their jobs to be interesting or very interesting. This suggests that the great majority of the sampled Air Force VI personnel are working on projects of interest to them. The confidence interval for this question is +/- 7.4% (80.6% - 95.4% of all Air Force VI professionals think their jobs are interesting or very interesting).

Questionnaire Item 4

The Item -- Think about the changes you have seen in your workplace in the past few years. What effect would you say these changes have had on the conditions of your workplace? Have they made conditions:

(a)_____very improved?

(b)_____somewhat improved?

(c)_____no different?

(d)_____somewhat worse?

(e)_____much worse?

Rationale -- The purpose of this question was to assess each respondent's perception of recent changes in their workplace. This measurement allowed the researcher to measure if a person's attitude toward past changes was correlated to their perception of proposed future changes.

Results -- The overall sample frequencies are listed in Table 7 below:

Table 7

Frequencies for Attitudes about Past Changes

Value	Category	Respondents	Percent
1	Very Improved	76	46.1%
2	Somewhat Improved	64	38.8%
3	No Different	11	6.7%
4	Somewhat Worse	11	6.7%
5	Much Worse	3	1.7%
M = 1.79	**n** =	165[a]	100%

[a]Missing Cases =10

Analysis -- More than 84% of the respondents said that they thought recent changes in their workplace had made conditions somewhat or very improved. Although most people have accepted the restructuring of their career fields and organizations, the degree of positive reaction to change (almost 85%) was higher than anticipated. Less than 1 out of 5 sampled Air Force VI personnel had a neutral or negative perception of the recent organizational changes or technological initiatives. The 95% confidence interval for this question is +/- 7.6% (77.3% - 92.5% of all Air Force VI professionals think recent changes have made working conditions somewhat improved or very improved).

Questionnaire Item 5

The Item -- More changes are being planned for the future. In your opinion, what effect will these future changes have on your work conditions? Will future changes:

(a)_____improve work conditions a great deal?

(b)_____improve work conditions somewhat?

(c)_____make no difference in work conditions?

(d)_____make work conditions somewhat worse?

(e)_____make work conditions much worse?

Rationale -- The purpose of this question was to assess each respondent's perception of future changes in their workplace in general. The researcher did not specify any particular proposed change, but wanted to measure the respondent's "attitude toward change." (Question 19 in part 3 of the survey asked respondents for their perception of future changes which electronic imaging center (EIC) technologies might bring to their workplace. Both of these questions looked at "attitude toward change--one general and one specific). This measurement allowed the researcher to examine the relationship between other variables and a person's perception of future changes.

Results -- The overall sample frequencies are listed in Table 8 below:

Table 8

Frequencies for Attitudes about Future Changes

Value	Category	Respondents	Percent
1	Improve Great Deal	82	49.1%
2	Improve Somewhat	64	40.1%
3	No Different	11	6.6%
4	Somewhat Worse	6	3.6%
5	Much Worse	1	.6%
M = 1.79	**n** =	167[a]	100%

[a]Missing Cases =8

Analysis -- More than 89% of the respondents said that they thought future changes would make conditions somewhat or very improved in their workplace. This suggests that the greatest majority of Air Force VI professionals have a positive attitude toward future change. The 95% confidence interval for this question is +/- 7.5% (81.7% - 96.7% of all Air Force VI professionals think future changes will make working conditions somewhat improved or very improved).

Questionnaire Item 6

The Item -- How much control would you say your supervisor gives you in deciding how to accomplish and manage your assigned job tasks/responsibilities? Does your supervisor allow you to:

(a)_____make most decisions yourself?

(b)_____make some decisions for yourself?

(c)_____mostly do it the supervisor's way?

(d)_____clear every step/decision through him/her?

Rationale -- The purpose of this question was to assess each respondent's perception of how much they participate in the management of their work. Those who make some or most decisions for themselves were considered to be subject to a more participatory management style than others who must clear most or all decision through their supervisor. This measurement allowed the researcher to examine the relationship between participatory management style and other variables.

Results -- The overall sample frequencies are listed in Table 9 below:

Table 9

Frequencies for Decisions/Control

Value	Category	Respondents	Percent
1	Most Decisions	115	66.1%
2	Some Decisions	51	29.3%
3	Supervisor's Way	7	4%
4	Clear Everything	1	.6%
M = 1.39	**n** =	174[a]	100%

[a]Missing Cases =1

Analysis -- Almost two-thirds of the respondents reported that their supervisor allowed them to make most job-related decisions themselves. More than 95% of the respondents said that they could make some or most decisions themselves. This

result may challenge the perception of military management as highly centralized and authoritarian. The Air Force seems to be succeeding (at least in the visual information field) in it's efforts to promote a Total Quality Management (TQM) style which encourages subordinate participation in decision making. The 95% confidence interval for this question is +/- 7.4% (88% - 100% of all Air Force VI professionals make some or most job-related decisions for themselves).

Questionnaire Item 7

The Item -- How much input would you say you have into the process of making improvements in the work process and conditions of your work place? Would you say you have:

(a)_____a lot of input?

(b)_____some input?

(c)_____very little input?

(d)_____no input?

Rationale -- Like question #6 above, the purpose of this question was to assess each respondent's perception of how much they participate in the management of their work place. Those who have some or a lot of input into the process of making improvements were considered to be subject to a more participatory management style than others who had very little or no input . This measurement allowed the researcher to again examine the relationship between participatory management style and other variables.

Results -- The overall sample frequencies are listed in Table 10 below:

Table 10

Frequencies for Input Into the Work Process

Value	Category	Respondents	Percent
1	A Lot of Input	87	50%
2	Some Input	62	35.7%
3	Very Little Input	19	10.9%
4	No Input	6	3.4%
M = 1.68	**n** =	174[a]	100%

[a]Missing Cases =1

Analysis -- One-half of all the respondents reported that their supervisor allowed them to have a lot of input into the process of improving the work environment. make most job-related decisions themselves. More than 85% of the respondents said that they had some or a lot of input into the work process. This result may also challenge the perception that military management is inflexible and only wants people to do things "by-the-book." The 95% confidence interval for this question is +/- 7.4% (78.2% - 93% of all Air Force VI professionals have some or a lot of input into making improvements in the work process).

Questionnaire Item 8

The Item -- **If you are a supervisor:** Overall, how much do you consult and involve those that work for you when making decisions which affect work conditions (such as equipment selection and setting of procedures)? Do you consult and involve your subordinates:

(a)_____all the time?

(b)_____most of the time?

(c)_____some of the time?

(d)_____only on certain issues?

(e)_____almost never?

Rationale -- The purpose of this question was to assess how responding supervisors perceived their own management style. Those who consulted their subordinates most or all of the time when making decisions were considered to use a more participatory management style than those who consulted only some of the time, only on certain issues, or almost never. This measurement allowed the researcher to compare the supervisor's perception of their own management style with the perceptions of their subordinates. This provided a way of validating the use of participatory management style. It also allowed for the examination of the relationship between participatory management style and other variables.

Results -- The overall sample frequencies are listed in Table 11 below:

Table 11

Frequencies for Supervisors Use of Subordinate Input

Value	Category	Respondents	Percent
1	All The Time	36	35.6%
2	Most of The Time	48	47.5%
3	Sometimes	15	14.9%
4	Only Certain Issues	2	2%
5	Almost Never	0	0%
M = 1.83		n = 101[a]	100%

[a]Missing Cases =74

Analysis -- More than one-half of all the respondents indicated by answering this question that they supervised one or more people. This roughly correlates to the question in part 4 of the survey which asks each respondent the number of people they supervise. (84 indicated 1 or more--12 left the question blank--the rest answered 0). More than 83% of the respondents said that they consulted their subordinates most or all the time. The 95% confidence interval for this question is +/- 9.7% (73.4% - 92.8% of all Air Force VI supervisors consult their subordinates most or all the time when making decision which affect work conditions).

Survey Questions 9 to 17

These survey questions asked respondents to note the specific types of electronic imaging technologies they use, any training they received for them, and their opinion about how easy or difficult they were to learn and use.

Questionnaire Item 9

The Item -- The following Table is a list of current electronic imaging technologies used in the Air Force. Please indicate for each one whether you use it frequently, use it seldom, or don't use it at all. (Please mark all items--if you are not sure what it is, mark "Don't Use").

EIC Technology	Use Frequently	Use Seldom	Don't Use
35mm Fim Scanner	_____	_____	_____
B&W Laser Printer	_____	_____	_____
CD ROM	_____	_____	_____
Color Laser or Thermal Printer	_____	_____	_____
Digital Photo Image Editing	_____	_____	_____
Computer Flat Image Scanner	_____	_____	_____
Digital Photo Printer	_____	_____	_____
Digital Still Camera	_____	_____	_____
Film Recorder	_____	_____	_____
Graphic Imaging System	_____	_____	_____

EIC Technology	Use Frequently	Use Seldom	Don't Use
Image Transceiver	_____	_____	_____
Magneto/Optical Drive	_____	_____	_____
Still Video Camera	_____	_____	_____
Presentation Software	_____	_____	_____
Still Video Player	_____	_____	_____
Still Video Recorder	_____	_____	_____
Video Encoder/Decoder	_____	_____	_____
Video Printer	_____	_____	_____
Video Projector	_____	_____	_____
VideoShow, LiteShow. etc.	_____	_____	_____

Rationale -- The technologies listed in question nine were those used by the Air Force during the electronic imaging center (EIC) test of 1991 (EIC Test Plan, 1990). The purpose of this question was to allow the researcher to differentiate between respondent's who use electronic imaging technologies a great deal and those who use them a little or not at all. By differentiating between the groups of respondents, the researcher was able to test for differences in the attitudes of the user groups. The researcher was not interested in measuring the number of respondents who used each of the specific technologies--the researcher wanted instead to measure the number of specific technologies used by each respondent.

In order to assign a numerical value to the number of EIC technologies each respondent used, the researcher employed a subjective coding scheme. For each technology a respondent reported as "use frequently," they were given two points. For every technology marked as "use seldom," they received one point. No points were given for technologies marked as "don't use." The total points for each respondent were entered into the data field for question 9. This weighted numbering system allowed for up to 40 points since there were 20 electronic imaging technologies listed in question 9. The results ranged from a low of 0 to a high of 35.

Results -- The overall sample frequencies for EIC points by quartiles are depicted in Table 12 below:

Table 12.

Frequencies for EIC Points by Quartiles

Points	Category	Respondents	Percent
0 to 3	First Quartile	43	25%
4 to 10	Second Quartile	42	24.4%
11 to 17	Third Quartile	44	25.6%
18 to 35	Fourth Quartile	43	25%
M = 11.0		n = 172[a]	100%

[a]Missing Cases=3

Analysis -- Of the 175 respondents in the sample, 31 reported that they used no electronic imaging technologies (zero points) and 3 did not answer the question. In order to compare those who use a great deal of EIC technology with those who use little or none, the researcher split the respondents into two groups: "high-tech" and a

"low-tech." This was done by selecting the top 25% of the respondents (18 to 35 points) to be the high tech group. All other respondents were included in the low tech group for statistical comparison. The rationale for this split is that the high tech group scored 45 percent or more of all possible electronic imaging center (EIC) points in question 9. The researcher was confident that this group made the greatest use of electronic imaging technologies in their jobs. The results of this coding scheme are shown in Table 13 below:

Table 13

Frequencies for High-Tech and Low-Tech Users

Value	Category	Respondents	Percent
1[a]	Low-Tech Group	129	75%
4[b]	High-Tech Group	43	25%
M = 1.68	**n** =	172[c]	100%

[a]Value 1-3 collapsed into 1 [b]Top Quartile [c]Missing Cases=3

Analysis -- Although the four locations used for the EIC test of 1992 (Barksdale, Eielson, Elemendorf, and Hurlburt) received a great deal of money and new equipment, they made up only 42 percent of the high tech group. However, the data did show a higher percent usage of electronic imaging at these four locations than was found at other other units (56% of respondents were high tech vs. 20% of respondents at other locations). It is interesting to note that the majority (58%) of the high tech group came from Air Force visual information (VI) units who received no special funding, but who still relied heavily on EIC technologies for part of their operation.

Questionnaire Item 10

The Item -- Overall, for those electronic imaging technologies that you presently use (those you checked "Use Frequently" or "Use Seldom" in question #9), consider the type and amount of training you have received for them. For each category of training below, circle the number that best represents the amount of training you received; 1=very little, 5=a lot, and 0=none.

Type	None				A Little	A Lot
a. Tutorial	0	1	2	3	4	5
b. Course/Seminar	0	1	2	3	4	5
c. Resident Expert/OJT	0	1	2	3	4	5
d. Self Teaching	0	1	2	3	4	5
e. Other Outside Source	0	1	2	3	4	5

Rationale -- The purpose of this question was to assess the quantity and type of training each respondent had received for their electronic imaging systems. This measurement allowed the researcher to examine the relationship between the type/amount of training and other variables.

Results -- The overall sample frequencies are listed in Table 14 below:

Table 14

Frequencies for Type & Amount of Training

Type	0-None	1-A Little	2	3	4	5-A Lot	M
Tutorial	35	27	22	21	16	12	1.94
(Missing Cases=42)	(26%)	(20%)	(17%)	(16%)	(12%)	(9%)	
Course/Seminar	81	17	8	11	5	7	0.94
(Missing Cases=46)	(63%)	(13%)	(5%)	(9%)	(4%)	(6%)	
Resident Expert/OJT	29	9	13	18	28	35	2.85
(Missing Cases=43	(22%)	(7%)	(10%)	(14%)	(21%)	(26%)	
Self Teaching	4	8	14	12	36	62	3.87
(Missing Cases=39)	(3%)	(6%)	(10%)	(9%)	(26%)	(46%)	
Other Outside	57	24	15	9	10	13	1.45
(Missing Cases=47)	(44%)	(19%)	(12%)	(7%)	(8%)	(10%)	

Analysis -- The type/amount of training that survey respondents received for electronic imaging systems (EIC) can be rank-ordered from most-to-least as follows: (1) Self Teaching, (2) Resident Expert/OJT, (3) Tutorial, (4) Other Outside, and (5) Course/Seminar. Over 45% of the respondents had done "a lot" of self teaching to learn their EIC systems. A similar percentage had not attended any outside training (45%). Almost two-thirds had never received any course/seminar training (63%). By comparison, only 3% had never used self teaching to learn an EIC system. The confidence interval for this question is +/- 8.6% (37% - 54% of all Air Force VI personnel used "a lot" of self teaching to learn their EIC systems).

Questionnaire Item 11

The Item -- Considering the training you received for the electronic imaging systems that you now use, would you say that overall the training has been:

(a)_____excellent

(b)_____good

(c)_____adequate

(d)_____less than adequate

(e)_____very inadequate

Rationale -- The purpose of this question was to access the perceived quality of training each respondent received for their EIC systems. This measurement allowed the researcher to examine the relationship between training quality and other variables.

Results -- The overall sample frequencies are listed in Table 15 below:

Table 15

Frequencies for Training Quality

Value	Category	Respondents	Percent
1	Excellent	13	9.8%
2	Good	42	31.8%
3	Adequate	39	29.5%
4	Less Than Adequate	24	18.3%
5	Very Inadequate	14	10.6%
M = 2.87	**n** =	132[a]	100%

[a]Missing Cases=43

Analysis -- Over 71% of the respondent's said that the quality of the training they received for EIC systems was adequate, good, or excellent. This suggests that over two-thirds of the sample believe that their training was good enough to allow them use their EIC systems. Interestingly, about as many respondent felt that their training was very inadequate (10.6%) as felt it was excellent (9.8). If the Air Force's goal was to provide at least "adequate" training for all their people, than they have fallen short. Almost 30% of the respondents said their training had been less than or very inadequate. The confidence interval for this question is +/- 8.5% (62.6% to 79.6% of all Air Force personnel who use EIC systems believe that their training was adequate or better).

Questionnaire items 12 through 17

The Items -- For the electronic imaging systems that you now use, (those you checked "Use Frequently" or "Use Seldom" in question #9, indicate whether you agree or disagree with the following statements. Circle the number that best describes your opinion (1=strongly disagree, 9=strongly agree):

	Strongly Disagree								Strongly Agree
12. The electronic imaging systems are easy to learn.	1	2	3	4	5	6	7	8	9
13. I find it easy to get the electronic imaging systems to do what I want them to.	1	2	3	4	5	6	7	8	9

	Strongly Disagree								Strongly Agree
14. My interaction with the electronic imaging systems is easy to understand.	1	2	3	4	5	6	7	8	9
15. The electronic imaging systems are very flexible to interact with.	1	2	3	4	5	6	7	8	9
16. It is easy to become skilful with the electronic imaging systems.	1	2	3	4	5	6	7	8	9
17. Overall, I find the EIC systems easy to use.	1	2	3	4	5	6	7	8	9

Rationale -- The purpose of these questions to was assess each respondent's perception of the "user friendliness" of the electronic imaging center (EIC) systems that they use. These six questions were developed and tested by Davis (1989) to measure end-user acceptance of new information technology based o the "perceived user friendliness" of these systems. A mathematical mean for this group of questions was calculated for each respondent. This numerical value between 1 and 9 became the "EIC user friendly" score and was entered into a data field for each respondent.

To help simplify the display and analysis of the EIC user friendly scores, the interval scale (1 to 9) was recoded into an ordinal scale as follows: values from 1 to 3 were coded as (1) "Unfriendly;" values from 4 to 6 were coded as (2) "Friendly;" and values 7 to 9 were coded as (3) "Very Friendly." This measurement allowed the

researcher to examine the relationship between EIC user friendliness and other variables.

Results -- The overall sample frequencies are listed in Table 16 below:

Table 16

Frequencies for EIC User Friendliness

Value	Category	Respondents	Percent
1	Unfriendly	7	5.3%
2	Friendly	69	51.8%
3	Very Friendly	57	42.9%
M = 2.38	**n** =	133[a]	100%

[a]Missing Cases=42

Analysis -- Over 94% of the respondents said that the found the electronic imaging center (EIC) systems they used to be user friendly or very user friendly. This suggests that the user interface of most systems was easy enough for people to learn and use in their job. Only a very small percentage (5.3%) felt that the systems were difficult to learn and to use. This is an interesting result since almost one-third (29%) of the respondents indicated on question 11 that the training they received for their EIC systems had been inadequate or very inadequate. The confidence interval for this question is +/- 8.5% (86.2% - 100% of all Air Force personnel think that their EIC systems are user friendly or very user friendly).

Survey Questions 19 to 25

These questions asked respondents to offer their perceptions of the proposed conversion of all (or most) Air Force VI photographic, graphic, and presentation systems to electronic computer-based systems. Survey participants were asked to give their opinions even if they currently did not use any EIC systems in their work.

Questionnaire Item 18

The Item -- Air Force VI leaders have proposed converting from traditional ways of producing and displaying audiovisual materials to all electronic systems. This proposal is known as the Electronic Imaging Center (EIC). How familiar would you say you are with the EIC concept? Are you:

(a)_____very familiar?

(b)_____somewhat familiar?

(c)_____somewhat unfamiliar?

(d)_____very unfamiliar?

Rationale -- The purpose of this question was to assess how familiar each respondent felt they were with the proposed EIC concept. This measurement allowed the researcher to examine the relationship between EIC familiarity and other variables.

Results -- The overall sample frequencies are listed in Table 17 below:

Table 17

Frequencies for EIC Familiarity

Value	Category	Respondents	Percent
1	Very Familiar	63	37.1%
2	Somewhat Familiar	59	34.6%
3	Somewhat Unfamiliar	20	11.8%
4	Very Unfamiliar	28	16.5%
M = 2.08	**n** =	170[a]	100%

[a]Missing Cases=5

Analysis -- More than 71% of the respondents said that they were somewhat or very familiar with the proposed EIC concept. This suggests that the Air Force visual information (VI) leadership has been doing a fairly good job of communicating their plan to the field. However, almost 29% said that they were somewhat or very unfamiliar with concept. Air Force VI leaders could stand to improve their communication with the field units. The 95% confidence interval for this question is +/-7.4% (64.3% - 79.1% of Air Force VI professionals are somewhat or very familiar with the proposed EIC concept).

Questionnaire Item 19

The Item -- Based on what you know about the Electronic Imaging center concept, how do you feel about the future introduction of these technologies into your workplace? Overall, do you think:

(a)_____It will have a very positive effect?

(b)_____It will have some positive effect?

(c)_____It will have some negative effect?

(d)_____It will have a very negative effect?

Rationale -- The purpose of this question was to assess each respondent's perception of the future consequence of implementing the proposed electronic imaging center (EIC) concept. This measurement allowed the researcher to examine the relationship between attitude toward future EIC-induced changes and other variables.

Results -- The overall sample frequencies are listed in Table 18 below:

Table 18

Frequencies for Attitudes about EIC-Induced Changes

Value	Category	Respondents	Percent
1	Very Positive Effect	85	52.4%
2	Some Positive Effect	64	39.5%
3	Some Negative Effect	10	6.2%
4	Very Negative Effect	3	1.9%
M = 1.57	**n** =	162[a]	100%

[a]Missing Cases=13

Analysis -- More than 91% of the respondents said that they felt that future introduction of the EIC technologies into their workplace would have some positive or a very positive effect. This result is roughly equivalent to the results of question #5 which asked about future changes in general (89% of the respondents felt that future changes would improve conditions somewhat or a great deal). This implies that a majority of VI professionals who know little or nothing about the EIC concept have a favorable attitude toward new imaging systems. These results should be good news to

anyone planning to spend millions of dollars converting the imaging systems being used by people in the field. The 95% confidence interval for this question is +/-7.5% (84.4% - 99.4% of all Air Force VI professionals think that the EIC concept will have some positive or a very positive impact on their work place).

Questionnaire Items 20 through 25

The Items -- Indicate whether you agree or disagree with the following statement. Circle the number that best describes you opinion (1=strongly disagree to 9= strongly agree). Please provide your opinion regardless of how little you may know about the specific systems. We are interested in what you think of new imaging technologies in general and the proposed changes.

	Strongly Disagree								Strongly Agree
20. The new imaging technologies will enable me to finish tasks more quickly.	1	2	3	4	5	6	7	8	9
21. Using new imaging technology will improve my job performance.	1	2	3	4	5	6	7	8	9
22. Using new imaging technology will increase my productivity.	1	2	3	4	5	6	7	8	9

	Strongly Disagree								Strongly Agree
23. Using new imaging technology will enhance my effectiveness on the job.	1	2	3	4	5	6	7	8	9
24. Using new imaging technology will make it easier to do my job.	1	2	3	4	5	6	7	8	9
25. Overall, I expect to find the new imaging technologies useful in my job.	1	2	3	4	5	6	7	8	9

Rationale -- The purpose of these six questions was to assess each respondent's "user acceptance" of the proposed electronic imaging center (EIC) systems. These six questions were developed and tested by Davis (1989) to measure end-user acceptance of new information technology based on the "perceived usefulness" of these systems. A mathematical mean for this group of questions was calculated for each respondent. This numerical value between 1 and 9 became the "EIC user acceptance" score and was entered into a data field for each respondent.

To help simplify the display and analysis of the EIC user acceptance scores, the interval scale (1 to 9) was recoded into an ordinal scale as follows: values from 1 to 3 were coded as (1) "Low Acceptance;" values from 4 to 6 were coded as (2) "Acceptance;" and values 7 to 9 were coded as (3) "High Acceptance." This

measurement allowed the researcher to examine the relationship between EIC user acceptance and other variables.

Results -- The overall sample frequencies are listed in Table 19 below:

Table 19

Frequencies for EIC User Acceptance

Value	Category	Respondents	Percent
1	Low Acceptance	10	6.1%
2	Acceptance	52	32.1%
3	High Acceptance	102	61.8%
M = 2.56	**n** =	165[a]	100%

[a]Missing Cases=10

Analysis -- Over 93% of the respondents reported that they accepted, or had a high level of acceptance for the proposed electronic imaging center (EIC) systems. This indicates that the vast majority of those surveyed believe the EIC systems would be moderately-to-highly useful in their jobs. Only a very small percentage (6.1%) felt that the EIC systems would not be useful. Once again, Air Force visual information (VI) professionals seemed to hold a positive attitude toward new imaging technologies even though most of them use very few of these systems in their present job. The 95% confidence interval for this set of questions is +/-7.6% (86.3% - 100% of all Air Force VI professionals accept or have a high acceptance of the proposed EIC technologies).

Survey Questions 26 to 32

These questions asked respondent's to provide demographic data including time of service, grade, specialty, number of people supervised, gender, and education

Questionnaire Item 26

The Item -- Year you entered government service_____.

Rationale -- The purpose of this question was to assess how long each respondent's had worked for the government. Many VI professionals have years of government service outside of the visual information field. This measurement allowed the researcher to differentiate between years of visual information experience and years working in federal service.

Results -- The overall sample frequencies are listed in Table 20 below:

Table 20

Frequencies for Years of Government Service

Value	Category	Respondents	Percent
1	1 to 5 Years	77	47.8%
2	6 to 10 Years	32	19.9%
3	11 to 15 Years	20	12.4%
4	16 to 20 Years	18	11.2%
5	More than 20 Years	14	8.7%
M = 2.13	**n** =	161[a]	100%

[a]Missing Cases=14

Analysis -- Almost half (47.8%) of the respondents had five or less years of government service. This is about what would be expected since around half of the enlisted members in the Air Force are in their first or second enlistment (less than 8 years). These results help to validate that the sample is representative of the population. The 95% confidence interval for this data is +/-7.7% (40.1 - 55.5% of all Air Force VI professionals have five or less years of government service.

Questionnaire Item 27

The Item -- Your present grade (E?, GS?)_____.

Rationale -- The purpose of this question was to assess each respondent's Air Force or civil service rank. Since rank is generally synonymous with position and degree of responsibility (there are some exceptions) this data allowed the researcher to compare the attitudes of lower ranking professionals with those having more authority.

Results -- The overall sample frequencies for rank are listed by visual information specialty in Tables 21 to 24 below:

Table 21

Frequencies for Rank of Graphics/Presentations Specialist

Rank	Category	Respondents	Percent
E-1	Airman Basic	4	4.7%
E-2	Airman	19	21.7%
E-3	Airman First Class	15	17.2%
E-4	Sergeant	23	26.3%
E-5	Staff Sergeant	15	17.2%
E-6	Technical Sergeant	8	9.3%
E-7	Master Sergeant	3	3.6%
M = 3.80	**n** =	87[a]	100%

[a]Missing Cases=2

Table 22

Frequencies for Rank of Photographers

Rank	Category	Respondents	Percent
E-1	Airman Basic	1	1.7%
E-2	Airman	8	13.6%
E-3	Airman First Class	15	25.3%
E-4	Sergeant	14	23.7%
E-5	Staff Sergeant	9	15.3%
E-6	Technical Sergeant	7	11.9%
E-7	Master Seargent	4	6.8%
E-8	Senior Master Seargent	1	1.7%
M = 4.09	**n** =	59[a]	100%

[a]Missing Cases=1

Table 23

Frequencies for Rank of Enlisted Supervisors

Rank	Category	Respondents	Percent
E-7	Master Seargent	2	22.2%
E-8	Senior Master Seargent	3	33.4%
E-9	Chief Master Seargent	4	44.4%
M = 8.22	**N** =	9	100%

Table 24

Frequencies for Rank of Civilians

Rank	Category	Respondents	Percent
GS-7	VI Specialist	2	28.6%
GS-9	VI Supervisor	1	14.3%
GS-11	VI Manager	2	28.6%
GS-12	VI Manager (2nd level)	1	14.3%
GS-13	VI Senior Manager	1	14.3%
M = 8.22	**n** =	7[a]	100%

[a]Missing Cases=1

Analysis -- The division of the sample group by rank is quite good with representation from every enlisted grade. The rank-division spread appears fairly even and representative with no large groupings in any one rank. The mean for the enlisted ranks was around "sergeant." This is about what was expected since most Air Force VI professionals make sergeant during their first enlistment (first 4 years) and promotions slower after that while many people do not re-enlist (for another 4 years).

Questionnaire Item 28

The Item -- Years of visual information experience_____.

Rationale -- The purpose of this question was to assess how long each respondent's had worked in the visual information field. This measurement allowed the researcher to differentiate between years of visual information experience and years working in federal service.

Results -- The overall sample frequencies are listed in Table 25 below:

Table 25

Frequencies for Years of Visual Information Experience

Value	Category	Respondents	Percent
1	1 to 5 Years	93	56.1%
2	6 to 10 Years	34	20.5%
3	11 to 15 Years	12	7.2%
4	16 to 20 Years	17	10.2%
5	More than 20 Years	10	6%
M = 1.89	**n** =	166[a]	100%

[a]Missing Cases=9

Analysis -- More than half (56.1%) of the respondents had five or less years of visual information experience. More than three-fourths of the respondent's (76.1%) had ten or fewer years of VI experience. As expected, the average years of VI experience (M = 1.89) was somewhat lower than average time of government service (M = 2.13).

The 95% confidence interval for this data is +/-7.6% (48.5 - 63.7% of all Air Force VI professionals have five or less years of visual information experience.

Questionnaire Item 29

The Item -- Your AFSC (Air Force Specialty Code)_____.

Rationale -- The purpose of this question was to help identify each respondent by their work-specialty. It was this data along with grade (item 27) that allowed the researcher to create tables showing the sample by specialty and grade. This information was needed to compare the sample with the known population perimeters.

Results -- The overall sample frequencies are listed in Table 26 below:

Table 26

Frequencies for Visual Information Specialty

Value	Category	Respondents	Percent
1	VI Specialist	87	53.3%
2	VI Photographer	59	36.3%
3	VI Supervisor	9	5.5%
4	VI Civilian Employee	7	4.3%
5	VI Officer	1	.6%
M = N.A.	**n** =	163[a]	100%

[a]Missing Cases=12

Analysis -- The sampled group appears to be a pretty good representation of the population. The VI specialists made up about 53% of the sample and compose nearly 50% of the population. The VI photographers made up about 36% of the sample

and compose about 41% of the population. The sample group percentage of VI supervisors was a little greater than the population because of a higher participation rate from this group. The civilian and officer respondents made up a combined 4.9% of the sample.

Questionnaire Item 30

The Item -- Number of people you supervise_____.

Rationale -- The purpose of this question was to assess the supervisory role of each respondent. Those respondents who supervised more people were considered to have a larger "supervisory role" than those who supervised fewer people or no one. This data allowed the researcher to examine the relationship between level of supervision and other variables.

Results -- The overall sample frequencies are listed in Table 27 below:

Table 27

Frequencies for People Supervised

Value	Category	Respondents	Percent
1	1 to 5 People	49	58.3%
2	6 to 10 People	14	16.7%
3	11 to 15 People	8	9.5%
4	16 to 20 People	4	4.8%
5	More than 20 People	9	10.7%
M = 1.93	**n** =	84[a]	100%

[a]Missing Cases=91

Analysis -- Almost half of the respondents (48%) reported that they supervised one or more people. This is about what would be expected since about 43% of the respondents reported having the rank of staff sergeant (E-5) or higher. Air Force members sometimes are given supervisory responsibility starting with sergeant (E-4) and are in placed in supervisory jobs when they make staff sergeant. More than 58% of the sampled supervisors reported that they supervise five or less people. This is also about what would be expected since most VI professionals have less than ten years of experience and therefore work at lower levels of supervision.

Questionnaire Item 31

The Item -- Your Gender (M or F)_____.

Rationale -- The purpose of this question was to assess each respondent's gender. This data allowed the researcher to examine the relationship between gender and other variables.

Results -- The overall sample frequencies are listed in Table 28 below:

Table 28

Frequencies for Gender

Value	Category	Respondents	Percent
1	Male	115	71.9%
2	Female	45	28.1%
M = N.A.	**n** =	160[a]	100%

[a]Missing Cases=15

Analysis -- The sample data shows that the majority Air Force VI professionals are male. A number of respondents wrote comments on their surveys like "what difference does it make?" This ratio of males to females is about what was expected since an estimated 25% of the VI population is female. The 95% confidence interval for this question is +/-7.7% (20.4% - 35.8% of all Air Force VI professionals are female).

Questionnaire Item 32

The Item -- Please circle the amount of formal education you have completed:

(a) High school or less

(b) Some College

(c) College graduate

(d) Post graduate degree

Rationale -- The purpose of this question was to assess each respondent's educational level. This data allowed the researcher to examine the relationship between education and other variables.

Results -- The overall sample frequencies are listed in Table 29 below:

Table 29

Frequencies for Educational Level

Value	Category	Respondents	Percent
1	High School or Less	40	24.2%
2	Some College	98	59.5%
3	College Graduate	23	13.9%
4	Post Graduate Degree	4	2.4%
M = 1.93	**n** =	165[a]	100%

[a]Missing Cases=10

Analysis -- Over three-quarters of the respondents had some college credit or a college degree (75.8%). Only 24.2 percent had only a high school diploma or less. This suggests that most Air Force VI professionals have at one time or presently are pursuing a college education. This may contradict some people's conception that military members have a much lower educational background than the general populace. The 95% confidence interval for this question is +/-7.6% (68.2% - 83.4% of all Air Force VI professionals have some college credit or a college degree).

Data Presentation Section Two: The Research Question

This section will analyze and present data which relates to the overall research question: "How does using new imaging technologies affect a media professional's self-reported job satisfaction, job diversity, and their attitude toward change in the workplace?" Each of the research sub-questions will be addressed in-turn by presenting relevant survey data and then analyzing it. After all the research sub-questions are considered, other pertinent data findings will be discussed and presented.

Research Sub-Questions

Sub-Question 1

The Sub-Question -- Do media professionals who use more electronic imaging technologies have greater job diversity, job interest and job satisfaction than comparable media professionals who use them less or not at all?

Relevant Variables -- The researcher used three dependent variables to examine this research sub-question (1) job diversity, (2) job interest, and (3) job satisfaction. The first dependent variable (job diversity) was measured by each respondent's answer to survey question 2. The second and third dependent variables (job interest and job satisfaction) were measured by their answers to questions 3 and 1 respectively.

The independent variable for this sub-question was the use of electronic imaging technology. Respondents were classified into high-tech and low-tech groups based on their EIC score obtained from survey question 9. Respondents scoring 18 EIC points or higher (the top 25%) were placed in the high-tech group. Those scoring 17 EIC points of less were placed into the low-tech group. The following is a comparison of the high-tech group and low-tech group responses for each of the dependent variables.

Job Diversity -- Table 30 below displays the crosstabulation between the low-tech and high-tech groups and their self-reported job diversity:

Table 30

Crosstabulation for Low/High Tech. by Job Diversity

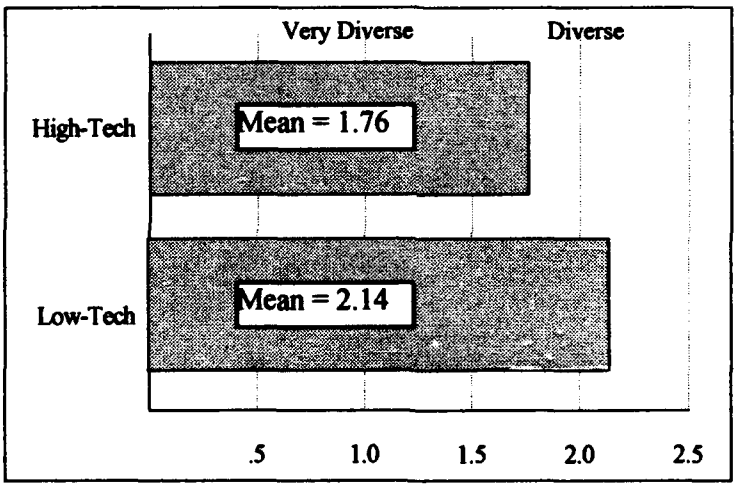
Value	Category	Low-Tech		High-Tech	
1	Very Diverse	25	(18.8%)	14	(35.9%)
2	Diverse	70	(52.6%)	20	(51.3%)
3	Similar	32	(24.1%)	5	(12.8%)
4	Very Much Alike	6	(4.5%)	0	(0%)
		n = 133		n = 39	

Analysis -- From a review of Table 30, it appears that a greater percentage of the high-tech group reported their job tasks to be very diverse than did those in the low-tech group (36% vs. 19%). By contrast, a higher percentage of the low-tech group reported they feel their job tasks to be similar or very much alike than those in the

high-tech group (29% vs. 13%). About the same percentage in both groups believe their job is diverse (53% low-tech vs 51% high-tech). This data suggests that media professionals who use more electronic imaging technologies may report greater overall job diversity than those using them less or not at all. To test this hypothesis, the job diversity mean for each group was calculated and a T-test of significance was performed. Figure 3 below displays the difference in the means between the two groups:

Figure 3.

Comparison of Job Diversity Means for High & Low Tech. Groups



The T value for this comparison was 2.74 and the probability that the difference occurred by chance was <0.007 (two-tail probability). Since the significance level was below 0.05, we rejected the null hypothesis that there is no difference in the reported job diversity of both groups. Correlation tests were then performed to measure the relationship between the amount of electronic imaging technology used and job diversity. The resulting Spearman Correlation value of 0.20 showed only a low level of correlation between the variables with a significance level of 0.007. This data indicates

that there may be a limited positive relationship between higher usage of electronic imaging technology and higher job diversity.

Job Interest -- Table 31 below displays the crosstabulation between the low-tech and high-tech groups and their self-reported job interest:

Table 31

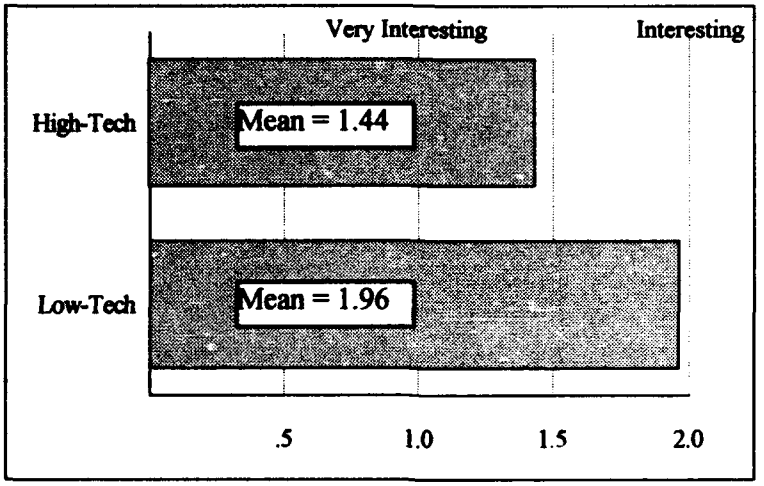
Crosstabulation for Low/High Tech. by Job Interest

Value	Category	Low-Tech		High-Tech	
1	Very Interesting	29	(21.8%)	22	(56.4%)
2	Interesting	83	(62.4%)	17	(43.6%)
3	Dull	18	(13.5%)	0	(0%)
4	Very Dull	3	(2.3%)	0	(0%)
		n = 133		n = 39	

Analysis -- Table 31 shows that a much higher percentage of the high-tech group feel their job tasks are very interesting than do those in the low-tech group (56% vs. 22%). By contrast 16% of the low-tech group reported they feel their job tasks are dull or very dull while none of the high-tech group felt this way. This data suggests that media professionals who use more electronic imaging technologies may have greater overall job interest than those using them less or not at all. To test this hypothesis, the job interest mean for each group was calculated and a T-test was performed. Figure 4 below displays the difference in the means between the two groups:

Figure 4.

Comparison of Job Interest Means for High & Low Tech. Groups



The T value for this comparison was 2.06 and the probability that the difference occurred by chance was <0.041 (two-tail probability). Since the significance level was below 0.05, we rejected the null hypothesis that there is no difference in reported job interest between groups. Correlation tests were performed to measure the relationship between the use of electronic imaging technology and job interest. The resulting Spearman Correlation value of 0.34 showed a moderate correlation between the variables with a significance level of 0.001. This data implies that there may be a moderately positive relationship between higher usage of electronic imaging technology and higher job interest.

Job Interest -- Table 32 below displays the crosstabulation between the low-tech and high-tech groups and their self-reported job satisfaction:

Table 32

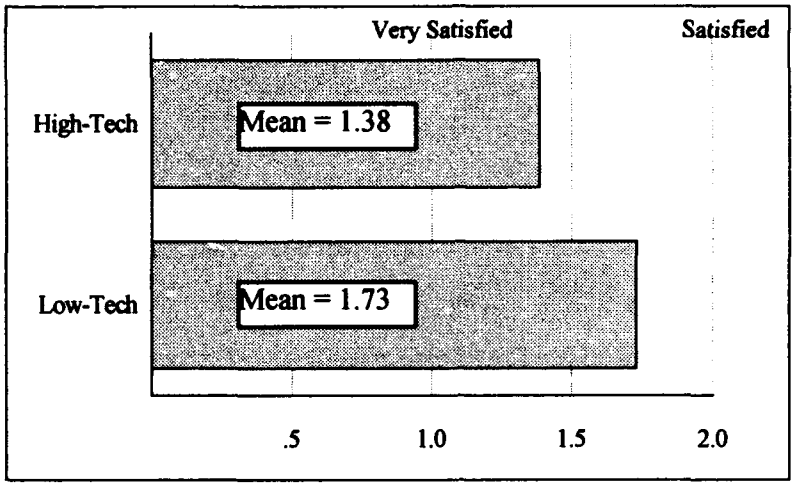
Crosstabulation for Low/High Tech by Job Satisfaction

Value	Category	Low-Tech		High-Tech	
1	Very Satisfied	50	(37.6%)	24	(61.5%)
2	Satisfied	71	(53.4%)	15	(38.5%)
3	Dissatisfied	10	(7.5%)	0	(0%)
4	Very Dissatisfied	2	(1.5%)	0	(0%)
		n = 133		n = 39	

Analysis -- Table 32 shows that a higher percentage of the high-tech group report they were very satisfied with their jobs than the low-tech group (62% vs. 38%). By contrast 12% of the low-tech group are dissatisfied or very dissatisfied with their job while none of the high-tech group felt this way. This data suggests that media professionals who use more electronic imaging technologies may have greater overall job satisfaction than those using them less or not at all. To test this hypothesis, the job satisfaction mean for each group was calculated and a T-test was performed. Figure 5 below displays the difference in the means between the two groups:

Figure 5.

Comparison of Job Satisfaction Means for High & Low Tech. Groups



The T value for this comparison was 3.00 and the probability that the difference occurred by chance was <0.003 (two-tail probability). Since the significance level was below 0.05, we rejected the null hypothesis that there is no difference in reported job satisfaction between groups. The correlation tests resulted in a Spearman Correlation value of 0.20 with a significance level of 0.003. This data implies that there may be a limited positive relationship between higher usage of electronic imaging technology and higher job satisfaction.

Sub-Question 2

The Sub-Question -- Do media professionals who use more electronic imaging technologies have a more positive attitude toward change than comparable media professionals who use them less or not at all?

Relevant Variables -- The researcher used two dependent variables to examine this research sub-question (1) attitude toward future change and, (2) attitude toward future EIC-caused change. The first dependent variable (attitude toward future change) was measured by each respondent's answer to survey question 5. The second dependent variable (attitude toward future EIC-caused change) was measured by their answer to question 19.

The independent variable for this sub-question was the same as for research sub-question 1 (use of electronic imaging technology). As before respondents were classified into high-tech and low-tech groups based on their EIC score obtained from survey question 9. Respondents scoring 18 EIC points or higher (the top 25%) were placed in the high-tech group. Those scoring 17 EIC points of less were placed into the low-tech group. The following is a comparison of the high-tech group and low-tech group responses for the sub-question 2 dependent variables.

Future Change -- Table 33 below displays the crosstabulation between the low-tech and high-tech groups and their self-reported attitude toward future change:

Table 33

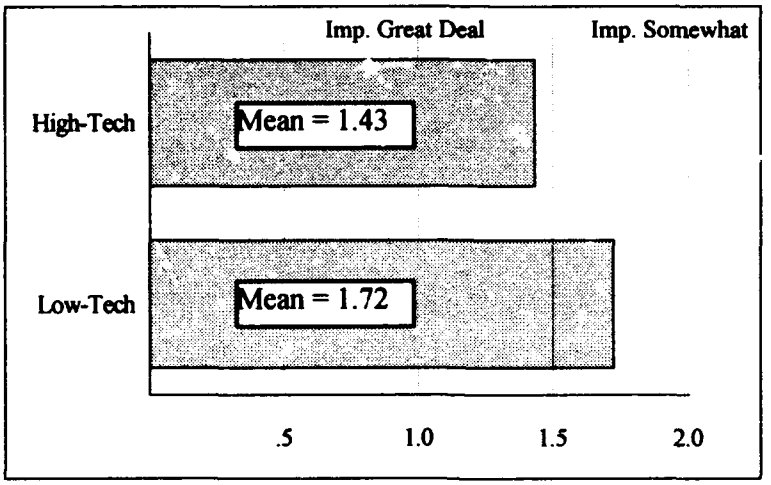
Crosstabulation for Low/High Tech. by Future Change

Value	Category	Low-Tech		High-Tech	
1	Improve Great Deal	54	(42.5%)	27	(73%)
2	Improve Somewhat	59	(46.5%)	7	(18.9%)
3	Make No Difference	9	(7.1%)	1	(2.7%)
4	Make Somewhat Worse	5	(3.9%)	1	(2.7%)
5	Make Much Worse	0	(0%)	1	(2.7%)
		n = 127		n = 37	

Analysis -- From a review of Table 33, it appears that a greater percentage of the high-tech group thought future changes would improve working conditions a great deal than did those in the low-tech group (73% vs. 43%). About the same percentage in both groups thought future changes would make no difference, make conditions somewhat worse, or make conditions much worse (11% low-tech vs 8% high-tech). This data suggests that media professionals who use more electronic imaging technologies may have a greater overall positive attitude toward future changes than those using them less or not at all. To test this hypothesis, the future changes mean for each group was calculated and a T-test of significance was performed. Figure 6 below displays the difference in the means between the two groups:

Figure 6.

Comparison of Future Change Means for High & Low Tech. Groups



The T value for this comparison was 1.39 and the probability that the difference occurred by chance was <0.051 (two-tail probability). Since the significance level was above 0.05, we could not reject the null hypothesis that there is no difference in the attitude toward future change as reported by both groups. Because the observed difference in the means were not statistically significant, correlation tests were not performed to measure the relationship between the amount of electronic imaging technology used and attitude toward future change.

Attitude Toward Future EIC-caused Change -- Table 34 below displays the crosstabulation between the low-tech and high-tech groups and their self-reported perception of the future consequence of implementing the proposed EIC concept:

Table 34

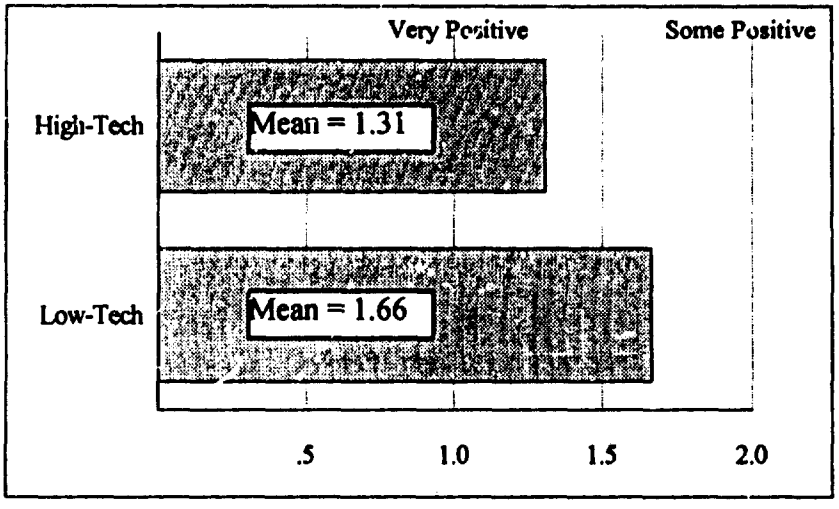
Crosstabulation for Low/High Tech. by Future EIC-caused Change

Value	Category	Low-Tech		High-Tech	
1	Very Positive Effect	55	(45.1%)	29	(74.4%)
2	Positive Effect	55	(45.1%)	9	(23.1%)
3	Some Negative Effect	10	(8.2%)	0	(0%)
4	Very Negative Effect	2	(1.6%)	1	(2.6%)
		n =	122	n =	39

Analysis -- Table 34 snows that a much higher percentage of the high-tech group feel that the future introduction of electronic technologies into their workplace will have a very positive effect than do those in the low-tech group (74% vs. 45%). By contrast 10% of the low-tech group reported they think it will have some or a very negative effect while only 3% of the high-tech group felt this way. This data suggests that media professionals who use more electronic imaging technologies may have a more positive attitude toward future EIC-induced changes than those using them less or not at all. To test this hypothesis, the EIC effect mean for each group was calculated and a T-test was performed. Figure 7 below displays the difference in the means between the two groups:

Figure 7.

Comparison of EIC Effect Means for High & Low Tech. Groups



The T value for this comparison was 2.85 and the probability that the difference occurred by chance was <0.005 (two-tail probability). Since the significance level was below 0.05, we rejected the null hypothesis that there is no difference in the attitude towards future EIC-induced change between the two groups. Correlation tests were performed to measure the relationship between the use of electronic imaging technology and attitude toward the EIC effect. The resulting Spearman Correlation value of 0.25 showed a low level of correlation between the variables with a significance level of 0.001. This data implies that there may be a limited positive relationship between higher usage of electronic imaging technology and a more positive attitude toward the introduction of electronic imaging technologies into the work place.

Sub-Question 3

The Sub-Question -- Does the quality and amount of training provided for new systems affect a media professional's acceptance of new technology?

Relevant Variables -- The researcher used the dependent variable of electronic imaging center (EIC) user acceptance to examine this research sub-question. This dependent variable was measured by each respondent's answers to survey question 20 through 25. The mathematical mean for these six questions was calculated for each respondent and became their EIC user acceptance score. These scores were grouped into three categories to simplify the analysis process (1) low acceptance, (2) acceptance, and (3) high acceptance.

The independent variables for this sub-question were the five types of training identified in the survey and the reported overall training quality. The five types of training were (1) tutorial, (2) course seminar, (3) resident expert/OJT, (4) self teaching, and (5) other outside. The amount of training each respondent received for these five types of training was measured by survey question 10. The overall quality of the training each respondent had received for their electronic imaging systems was measured by survey question 11. The following are comparisons of the dependent variable responses for each of the independent variables.

Tutorial -- Table 35 below displays the crosstabulation between acceptance of electronic imaging systems and the self-reported amount of tutorial training:

Table 35

Crosstabulation for EIC Acceptance by Tutorial Training

Value	Category	Low Accept		Accept		High Accept	
0	None	3	(9.4%)	13	(40.6%)	16	(50%)
1	A Little	2	(7.4%)	6	(22.2%)	19	(70.4%)
2		1	(4.5%)	7	(31.8%)	14	(63.6%)
3		1	(4.8%)	4	(19%)	16	(76.2%)
4		0	(0%)	4	(26.7%)	11	(73.3%)
5	A Lot	0	(0%)	3	(25%)	9	(75%)
		n =	7	n =	37	n =	85

Analysis -- There appears to be no real difference in the acceptance of EIC technologies and the amount of tutorial training a respondent receives. The only difference suggested by Table 35 is that those who receive no tutorial training have a slightly lower acceptance level than those who receive a little or a lot (50% high acceptance vs. 64% - 75% respectively). An analysis of variance (ANOVA) shows that no two groups in Table 35 are statistically different at the 0.05 level of significance. The researcher does not reject the null hypothesis that the amount of tutorial training has no effect on user acceptance of EIC technology.

Course/Seminar -- Table 36 below displays the crosstabulation between acceptance of electronic imaging systems and the self-reported amount of course/seminar training:

Table 36

Crosstabulation for EIC Acceptance by Course/Seminar Training

Value	Category	Low Accept		Accept		High Accept	
0	None	6	(7.6%)	25	(31.6%)	48	(60.8%)
1	A Little	0	(0%)	4	(23.5%)	13	(76.5%)
2		1	(12.5%)	2	(25%)	5	(62.5%)
3		0	(0%)	2	(20%)	8	(80%)
4		0	(0%)	0	(0%)	5	(100%)
5	A Lot	0	(0%)	2	(33.3%)	4	(66.7%)
		n =	7	n =	35	n =	83

Analysis -- There appears to be no real difference in the acceptance of electronic imaging center (EIC) technologies and the amount of course/seminar training a respondent receives. An analysis of variance (ANOVA) shows that no two groups in Table 36 are statistically different at the 0.05 level of significance. Because of these results, the researcher does not reject the null hypothesis that the amount of course/seminar training has no effect on user acceptance of EIC technology.

Resident Expert/OJT – Table 37 below displays the crosstabulation between acceptance of electronic imaging systems and the self-reported amount of resident expert/OJT training received:

Table 37

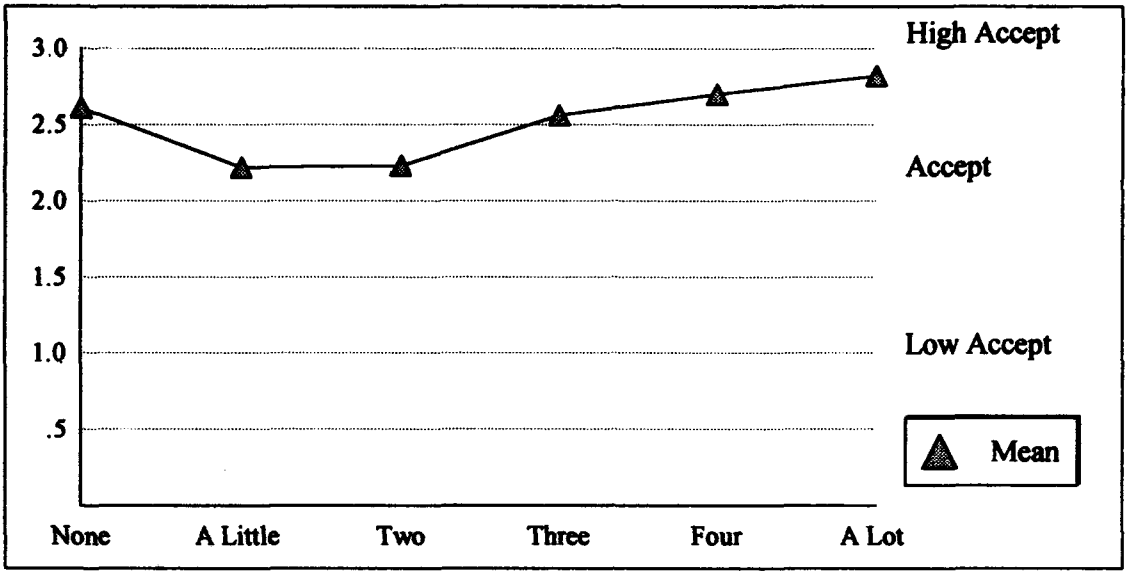
Crosstabulation for EIC Acceptance by Resident Expert/OJT Training

Value	Category	Low Accept		Accept		High Accept	
0	None	2	(7.1%)	7	(25%)	19	(67.9%)
1	A Little	2	(22.2%)	3	(33.3%)	4	(44.4%)
2		3	(23.1%)	4	(30.8%)	6	(46.2%)
3		0	(0%)	8	(44.4%)	10	(55.6%)
4		0	(0%)	8	(29.6%)	19	(70.4%)
5	A Lot	0	(0%)	6	(18.3%)	27	(81.8%)
		n =	7	n =	35	n =	85

Analysis – There appears to be a linear relationship between the amount of resident expert/OJT training received and the level of acceptance of EIC technologies The Pearson chi-square statistic is 22.53 and the observed significance level is 0.0126. Because the significance level is below 0.05, the researcher can reject the null hypothesis that the amount of resident expert/OJT training has no effect on user acceptance of EIC technology. Figure 8 below displays the nearly linear relationship of the means between the six groups:

Figure 8.

Comparison of Means for Expert/OJT Training and EIC Acceptance



The relationship illustrated in Figure 8 shows a curvilinear correlation between the variables. Those who reported receiving no expert/OJT training actually had a higher acceptance level of electronic imaging center (EIC) technologies than those who reported little or circled numbers 2-3. But for those who reported a little or more expert/OJT training, the there appears to be a positive linear relationship. To test this hypothesis, correlation tests were performed to measure the relationship between the amount of resident expert/OJT training and acceptance of electronic imaging technology. The resulting Spearman Correlation value of 0.19 shows only a low level of correlation between the variables with a significance level of 0.031. This data indicates that there may be a limited positive relationship between greater amounts of resident expert/OJT training and acceptance of electronic imaging technology.

Self Teaching -- Table 38 below displays the crosstabulation between acceptance of electronic imaging systems and the amount of self teaching the respondents report using to learn their EIC systems:

Table 38

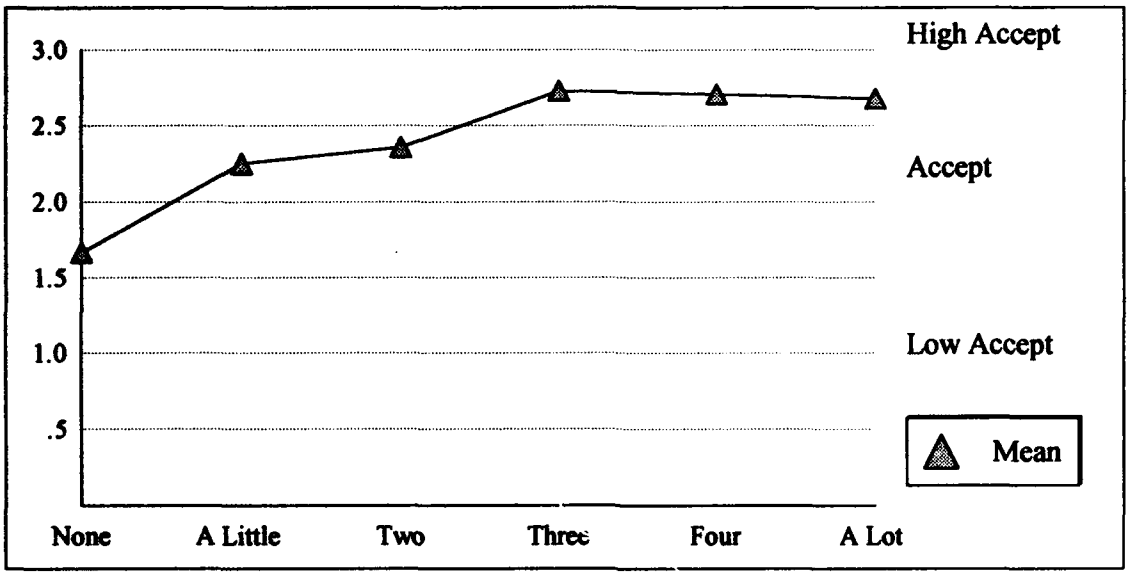
Crosstabulation for EIC Acceptance by Self Teaching

Value	Category	Low Accept		Accept		High Accept	
0	None	1	(33.3%)	2	(66.7%)	0	(0%)
1	A Little	2	(25%)	2	(25%)	4	(50%)
2		1	(7.1%)	7	(50%)	6	(42.9%)
3		0	(0%)	3	(27.3%)	18	(72.7%)
4		1	(2.9%)	8	(23.5%)	25	(73.5%)
5	A Lot	2	(3.2%)	16	(25.8%)	44	(71%)
		n =	7	n =	38	n =	87

Analysis -- There appears to be a positive relationship between the amount of self teaching used and the level of acceptance of EIC technologies The Pearson chi-square statistic is 20.11 and the observed significance level is 0.0282. Because the significance level is below 0.05, the researcher rejects the null hypothesis that the amount of self teaching used has no effect on user acceptance of EIC technology. Figure 9 below displays the linear relationship of the means between the six groups:

Figure 9.

Comparison of Means for Self Teaching and EIC Acceptance



The relationship illustrated in Figure 9 shows a definite linear correlation between the variables. Those who reported using more self teaching appear to have a higher acceptance level of electronic imaging center (EIC) technologies than those who reported using less. It is interesting to note that as the responses approach the degree of using a lot of self teaching the acceptance levels off and even decreases slightly. This may suggest that self teaching improves the acceptance of electronic imaging systems only up to a certain point. The Spearman Correlation test of the hypothesis that self teaching increases EIC acceptance shows a value of 0.20. This implies only a low level of correlation between the variables with a significance level of 0.024. This data indicates that there may be a limited positive relationship between greater amounts of self teaching and acceptance of electronic imaging technology.

Other Outside -- Table 39 below displays the crosstabulation between acceptance of electronic imaging systems and the amount of other outside training that respondent report receiving to learn their EIC systems:

Table 39

Crosstabulation for EIC Acceptance by Other Outside Training

Value	Category	Low Accept		Accept		High Accept	
0	None	5	(9.3%)	16	(66.7%)	33	(61.1%)
1	A Little	1	(4.2%)	7	(25%)	16	(66.7%)
2		1	(6.7%)	4	(50%)	10	(66.7%)
3		0	(0%)	2	(27.3%)	6	(75%)
4		0	(0%)	2	(23.5%)	8	(80%)
5	A Lot		(0%)	5	(25.8%)	8	(61.5%)
		n = 7		n = 36		n = 81	

Analysis -- There appears to be no real difference in the acceptance of EIC technologies and the amount of other outside training a respondent received. An analysis of variance (ANOVA) shows that no two groups in Table 39 are statistically different at the 0.05 level of significance. The researcher can not reject the null hypothesis that the amount of other training used to learn a system has no effect on user acceptance of that EIC technology.

Training Quality -- Table 40 below displays the crosstabulation between acceptance of electronic imaging systems and the reported quality of the training that respondents had reported receiving to learn their EIC systems:

Table 40

Crosstabulation for EIC Acceptance by Training Quality

Value	Category	Low Accept		Accept		High Accept	
1	Excellent	0	(0%)	4	(30.8%)	9	(69.2%)
2	Good	0	(0%)	9	(23.7%)	29	(76.3%)
3	Adequate	1	(2.6%)	13	(33.3%)	25	(64.1%)
4	Less Than Adequate	2	(8.3%)	6	(25%)	16	(66.7%)
5	Very Inadequate	3	(21.4%)	2	(14.3%)	9	(64.3%)
		n =	6	n =	34	n =	81

Analysis -- There appears to be no real difference in the acceptance of electronic imaging center (EIC) technologies and the reported quality of the training a respondent received. An analysis of variance (ANOVA) shows that no two groups in Table 40 are statistically different at the 0.05 level of significance. Because of this, the researcher can not reject the null hypothesis that the quality of the training used to learn a system has no effect on user acceptance of that EIC technology.

Sub-Question 4

The Sub-Question -- Does a participatory management style increase user acceptance of electronic imaging technologies more than using an autocratic style?

Relevant Variables -- As with research sub-question 3, the researcher used the dependent variable of EIC user acceptance to examine this research sub-question. As noted before, the mathematical mean for each respondent's answers to survey questions 20 through 25 were used to group them into one of three categories (1) low acceptance, (2) acceptance, and (3) high acceptance.

The independent variables for this sub-question were the self-reported degrees to which respondents made job decisions for themselves and the amount of input they had into the work process on their job. The level of decision making ability was measured by survey question 6. Respondents who made some or most decisions for themselves were considered to be subject to a participatory management style. Those doing things the supervisors way or clearing every step through their bosses were considered to be subject to a more autocratic management style. The level of input into the job process was measured by survey question 7. A higher level of input was considered to be a more participatory management style while a low degree of input was thought to be more autocratic. The following is a comparison of the dependent variable of EIC acceptance for each of the independent variables.

Making Decisions -- Table 41 below displays the crosstabulation between acceptance of electronic imaging systems and the self-reported authority to make job related decisions for themselves:

Table 41

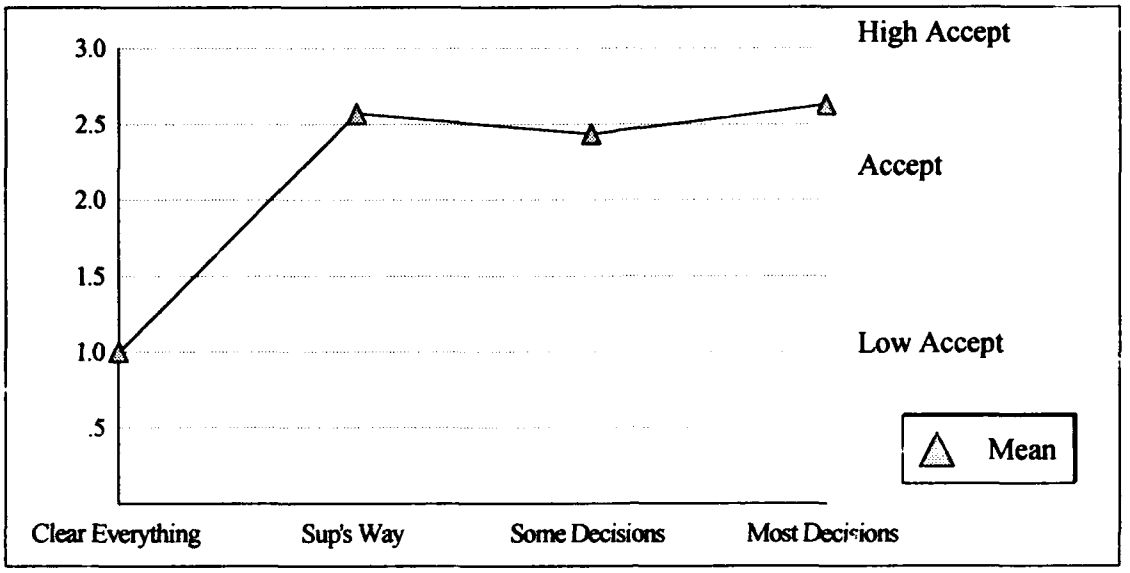
Crosstabulation for EIC Acceptance by Decision Authority

Value	Category	Low Accept		Accept		High Accept	
1	Most Decisions	4	(40%)	33	(63.5%)	73	(71.6%)
2	Some Decisions	5	(50%)	16	(30.8%)	25	(24.5%)
3	Supervisor's Way	0	(2.6%)	3	(5.8%)	4	(3.9%)
4	Clear Everything	1	(10%)	0	(0%)	0	(0%)
		n =	10	n =	52	n =	102

Analysis -- There appears to be a positive relationship between the level of authority to make decisions and the level of acceptance of EIC technologies The Pearson chi-square statistic is 19.94 and the observed significance level is 0.0284. Since the observed difference is statistically significant (below 0.05), the researcher can reject the null hypothesis that the degree to which respondents can make job decisions for themselves has no effect on user acceptance of EIC technology. Figure 10 below displays the relationship of the means between the variables:

Figure 10.

Comparison of Means for Decision Authority and EIC Acceptance



The relationship illustrated in Figure 10 appears to show a non-linear correlation between the variables. Those who reported having more decision making authority seem to have a higher acceptance level of EIC technologies than those who reported having less. However, those who can make some decisions for themselves have a slightly lower EIC acceptance level than those who do things the supervisor's way. A test of the hypothesis that participatory management style increases EIC acceptance gives us a Spearman Correlation value of -0.14. While this indicates the existence of a low level correlation between the variables, it is not statistically significant (approximate significance = 0.068). Therefore, this statistic gives us no reason to believe that decision making authority and EIC acceptance data are related in the population. Based on these survey results, there does not appear to be a linear relationship between higher levels of decision authority and greater acceptance of electronic imaging technologies.

Input to Work Process -- Table 42 below displays the crosstabulation between acceptance of electronic imaging systems and the self-reported level of input that respondents have into the work process:

Table 42

Crosstabulation for EIC Acceptance by Level of Input

Value	Category	Low Accept		Accept		High Accept	
1	A Lot of Input	4	(40%)	28	(53.8%)	49	(48%)
2	Some Input	3	(30%)	16	(30.8%)	39	(38.2%)
3	Very Little Input	1	(10%)	8	(15.4%)	10	(9.8%)
4	No Input	2	(20%)	0	(0%)	4	(3.9%)
		n = 10		n = 52		n = 102	

Analysis -- There appears to be no real difference in the acceptance of EIC technologies and the level of input that respondents had into the job process. The ANOVA test confirms that no two groups in Table 42 are statistically different at the 0.05 level of significance. Because of the observed differences are not statistically significant, the researcher can not reject the null hypothesis that the level of input a person has into their job process has no effect on their acceptance of EIC technology.

Sub-Question 5

The Sub-Question -- Does the "user friendliness" of new electronic imaging systems affect the acceptance of that technology by media professionals?

Relevant Variables -- As with research sub-question 3 and 4, the researcher used the dependent variable of EIC user acceptance to examine this research sub-question. Once again, the mathematical mean for each respondent's answers to survey questions 20 through 25 were used to group them into one of three categories (1) low acceptance, (2) acceptance, and (3) high acceptance.

The independent variable for this sub-question was the mathematical mean for each respondent's answers to questions 12 through 17. These six questions asked for their perception of the user friendliness of their present EIC systems. The researcher wanted to know if the user's perception of their present EIC system user friendliness affected their acceptance of future EIC technologies. The following is a comparison of the dependent variable EIC acceptance and the independent variable of user friendliness.

User Friendliness -- Table 43 below displays the crosstabulation between acceptance of electronic imaging systems and the reported user friendliness of these systems:

Table 43

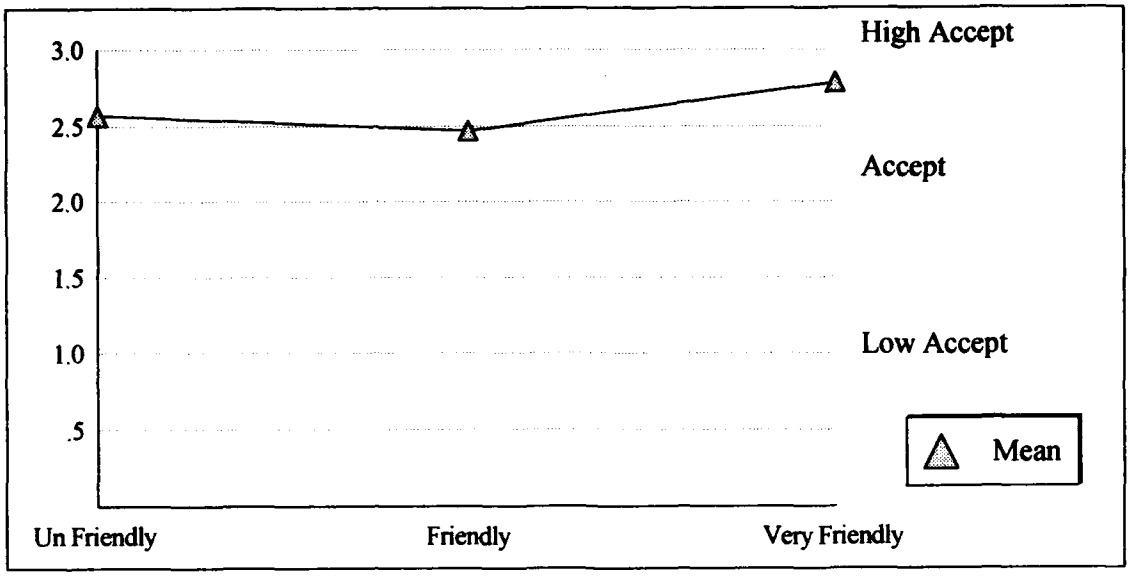
Crosstabulation for EIC Acceptance by System User Friendliness

Value	Category	Low Accept		Accept		High Accept	
1	Un-Friendly	0	(0%)	3	(42.9%)	4	(57.1%)
2	Friendly	4	(6.1%)	27	(40.9%)	35	(53%)
3	Very Friendly	2	(3.6%)	8	(14.3%)	46	(82.1%)
		n = 6		n = 38		n = 85	

Analysis -- Table 43 appears to show that respondent's who thought their present EIC systems were user friendly had a higher level of acceptance of future EIC technologies. The Pearson chi-square statistic for this crosstabulation is 12.47 and the observed significance level is 0.0142. Since the observed difference is statistically significant (below 0.05), the researcher can reject the null hypothesis that the user's perception of their present EIC system user friendliness has no effect on their acceptance of future EIC technologies. Figure 11 below displays the relationship of the means between the variables:

Figure 11.

Comparison of EIC Acceptance and System User Friendliness



The relationship illustrated in Figure 11 shows a curvilinear correlation between the variables. Those who reported their EIC systems were un-friendly actually had a slightly higher acceptance level of EIC technologies than those who reported their systems were friendly. However, for those who reported their EIC systems were very user friendly, the acceptance level appeared to be significantly higher. To test this hypothesis, correlation tests were performed to measure the relationship between the system user friendliness and the acceptance of future electronic imaging technology. The resulting Spearman Correlation value of 0.27 showed only a low level of correlation between the variables with a significance level of 0.001. This data indicates that there may be a limited positive relationship between greater system user friendliness and improved acceptance of electronic imaging technology.

Other Data and Findings

Job Diversity -- Two demographic factors were found to have a positive correlation with the Air Force visual information professional's reported job diversity. These demographic factors were (1) number of people supervised and (2) education respectively. Tables 44 and 45 display the crosstabulation between these relevant demographic factors and reported job diversity.

Table 44

Crosstabulation for Number of People Supervised by Job Diversity

Value	Category	Very Diverse		Diverse		Similar		Very Alike	
1	1 to 5 People	7	(14%)	29	(59%)	14	(24%)	1	(2%)
2	6 to 10 People	5	(36%)	7	(50%)	2	(14%)	0	(0%)
3	11 to 15 People	3	(37%)	2	(25%)	1	(13%)	2	(25%)
4	16 to 20 People	1	(25%)	3	(75%)	0	(0%)	0	(0%)
5	More than 20	6	(67%)	3	(0%)	0	(0%)	0	(0%)
		n =	22	n =	44	n =	15	n =	3

Analysis -- It appears that as the number of people supervised increased, the degree of job diversity would increase. The analysis of variance (ANOVA) test confirms that no two groups in Table 44 are statistically different at the 0.05 level of significance. The Pearson chi-square statistic was 27.09 and the observed significance level was .0075. It was not surprising to find data which suggests that job diversity increases with the number of people supervised. The additional supervisory responsibilities would naturally result in a wider range of management activities. The

Spearman value of 0.31 confirms the existence of a moderate positive correlation between the number of people supervised and reported job diversity.

Table 45

Crosstabulation for Education by Job Diversity

Value	Category	Very Diverse		Diverse		Similar		Very Alike	
1	High School	3	(7%)	22	(55%)	13	(33%)	2	(5%)
2	Some College	24	(25%)	54	(55%)	17	(17%)	3	(3%)
3	College Grad	10	(44%)	9	(39%)	3	(13%)	1	(4%)
4	Post Grad	0	(0%)	4	(100%)	0	(0%)	0	(0%)
		n =	37	n =	89	n =	33	n =	6

Analysis -- From Table 45 it appears that as the level of education increased, the degree of job diversity generally increased. This trend can be seen in the percentage of respondents reporting their jobs were diverse or very diverse (high school = 62%; some college = 80%; college grad = 83%; post grad = 100%). The ANOVA test confirmed the difference between the groups in Table 45 was statistically significant to the 0.05 level. The Pearson chi-square statistic was 17.44 and the observed significance level was .0422. The researcher did not find any other significant correlations for educational level other than job diversity. Since individual educational levels are openly known by Air Force supervisors, perhaps they are more likely to assign a variety of job tasks to those with more education. The Spearman value of 0.25 confirms the existence of a low-level positive correlation between educational level and reported job diversity.

Attitude Toward Change -- Two factors were found to have significant correlations with the Air Force visual information professional's attitude toward future change. These demographic factors were (1) years of government service and (2) attitude toward past change respectively. Tables 46 and 47 display the crosstabulation between these relevant demographic factors and reported attitude toward future change.

Table 46

Crosstabulation for Years of Service and EIC Acceptance

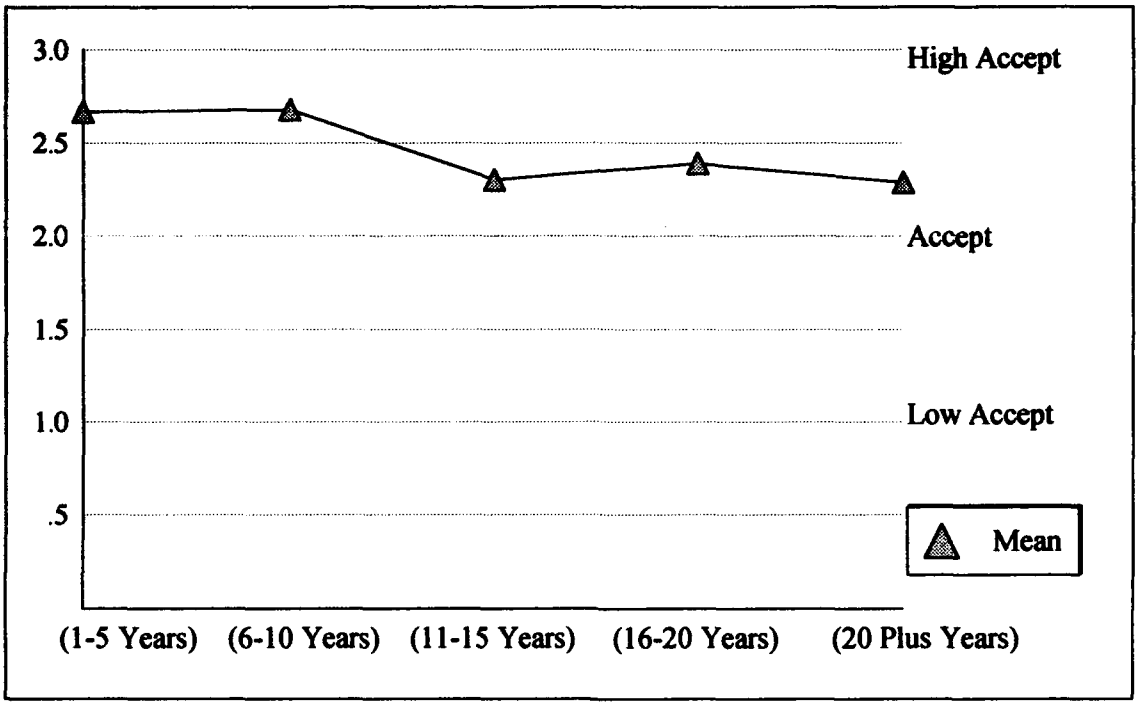
Value	Category	Low Accept		Accept		High Accept	
1	1 to 5 Years	1	(1%)	22	(31%)	49	(68%)
2	6 to 10 Years	1	(3%)	8	(26%)	22	(71%)
3	11 to 15 Years	4	(20%)	6	(30%)	10	(50%)
4	16 to 20 Years	2	(11%)	7	(39%)	9	(50%)
5	More than 20 Years	1	(7%)	8	(57%)	5	(36%)
		n = 9		n = 51		n = 95	

Analysis -- The analysis of variance (ANOVA) test confirmed the difference between the groups in Table 46 was statistically significant to the 0.05 level. It appears that as the years of service increased, the level of electronic imaging center (EIC) acceptance decreased. To test this hypothesis, the means were calculated for each "years of service" group and a negative linear relationship was established.

Figure 12 below displays the linear relationship between years of service and EIC acceptance:

Figure 12.

Comparison of EIC Acceptance and Years of Service



This trend for older visual information (VI) professionals to be less accepting of new technologies is not surprising. If anything, the slightly downward slope of the correlation suggests a healthy skepticism by more experienced VI professionals rather than outright rejection of new technology. The Pearson chi-square statistic was 17.29 and the observed significance level was .0274. The Spearman value of -0.21 confirmed the existence of a low-level negative correlation between years of government service and the acceptance of future EIC systems.

Table 47

Crosstabulation for Past Change Attitude and Future Change Attitude

	Attitude Toward Past Change									
Category (Future Change)	Very Improved		Somewhat Improved		No Difference		Somewhat Worse		Much Worse	
Improve Great Deal	49	(62%)	23	(29%)	2	(3%)	3	(4%)	2	(3%)
Improve Somewhat	21	(34%)	31	(51%)	7	(12%)	2	(3%)	0	(0%)
No Difference	1	(9%)	7	(64%)	2	(18%)	1	(9%)	0	(0%)
Somewhat Worse	1	(17%)	2	(33%)	0	(0%)	3	(50%)	0	(0%)
Much Worse	1	(100%)	0	(0%)	0	(0%)	0	(0%)	0	(0%)
	n = 73		n = 63		n = 11		n = 9		n = 2	

Analysis -- The analysis of variance (ANOVA) test confirmed the difference between groups was statistically significant to the 0.05 level in Table 47. It appears that respondents who had a more favorable opinion of past changes also tended to have a more positive attitude toward future change. This relationship seems only natural since people may base their opinions about future change on their past experiences with a similar kind of change. This hypothesis was tested by running correlation tests between the variables. The Pearson chi-square statistic was 47.87 with an observed significance level of .00005. The Spearman value of 0.33 confirmed the existence of moderate positive correlation between past change attitude and future change attitude.

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The data collected for this study can be condensed and categorized into the following six areas: (1) the data necessary for determining each respondent's opinion about job environment factors such as job diversity and the type of management used; (2) the data required to determine the amount of new imaging technology each respondent used on their job; (3) the data needed to determine the type, amount, and quality of training used while learning new electronic imaging systems; (4) the data required to measure how "user friendly" the respondent thought their electronic imaging systems were; (5) the data necessary for determining each respondent's attitude toward change and the future introduction of electronic imaging center (EIC) technologies; (6) the demographic profile of Air Force visual information (VI) professionals.

The study data collected from survey respondents indicates that most Air Force VI professionals (93%) are satisfied or very satisfied with their present job. This high degree of satisfaction may reflect the sense of teamwork and "mission" often found in

military organizations. Another possible explanation is the Air Force's recent use of several administrative and financial incentive programs to get thousands of people to voluntarily leave active duty. The high degree of job satisfaction may reflect the majority of survey respondents who have decided they prefer their present job to civilian life. Anyone who was dissatisfied could have exited the Air Force prior to the study. Three-fourths of the sampled Air Force VI professionals (75%) felt that their jobs were diverse or very diverse. This suggests that the business of providing audiovisual products to Air Force organizations allows for a good variety of job-tasks. An even higher percentage of respondents thought their job was interesting or very interesting (88%). Over half of those who thought their job was repetitive in nature still found their work to be interesting. The great majority of respondents reported a high degree of involvement in the management of their job-tasks. More than 95% said they made some or most job decisions for themselves while 85% reported that they had some or a lot of input into the work process. This data paralleled the response of supervisors (83%) who indicated that they consulted their subordinates most or all the time when making decisions which effect work conditions.

Data collected on the use of electronic imaging center (EIC) technologies resulted in a wide range of responses. About 18% of the respondents did not use any of the EIC technologies listed in the survey. Respondents who worked at one of the four EIC test bases were much more likely to use a variety of imaging technologies than those at the twelve other locations. However, it was interesting to note that about 20% of Air Force visual information (VI) professionals at the 12 non-EIC locations were heavy users of EIC technologies. This indicates that many electronic imaging

technologies have already been defused throughout the Air Force. This diffusion appears to have occurred without a formal implementation program from higher headquarters.

The data collected on training revealed some interesting results. In terms of most-used to least-used, the five types of training used for learning new imaging systems were: (1) self-teaching, (2) resident expert/OJT, (3) tutorial, (4) other outside, and (5) course seminar. It appears that Air Force VI professionals were expected to teach themselves how to use new imaging systems. This learning seems to have taken place almost exclusively on-the-job. One possible explanation for these results is that those who became proficient at new systems were heavily relied upon to teach others on-the-job. It was surprising to find that the tutorial form of learning was not used to a greater degree. Tutorials could lend themselves well to self-teaching (provided tutorials were available for the new imaging systems). The researcher postulates that either many electronic imaging systems did not come with tutorials, or that most Air Force VI professionals had to learn their systems by doing actual work orders rather than practice tutorials. Considering the heavy reliance on labor-intensive and informal forms of training like self-teaching, it was also somewhat surprising that 71% of the respondents felt their training had been adequate, good, or excellent. On the other hand, 29% felt their training had been inadequate or very inadequate.

Perhaps one reason most respondents said their training had been adequate is that most of them also reported the electronic imaging center (EIC) technologies were easy to operate. The data collected to measure the reported user friendliness of EIC systems showed that 43% felt they were very friendly, 52% felt they were friendly, and

only 5% thought they were unfriendly. The researcher examined the data to look for correlations between the amount/quality of training provided and the reported user friendliness of EIC systems. It was difficult to make any conclusions using the data since no statistically significant relationships were uncovered. Even so, the researcher suspects that the higher the quality of training received, the more user friendly an EIC system will seem. Perhaps the very small use of system-specific training (such as courses and seminars), meant that there was just not enough study data to adequately test this hypothesis.

The data concerning attitude toward change showed an overall optimistic view of the future by Air Force visual information (VI) professionals. More than 89% of the respondents said they thought future changes would make conditions somewhat or very improved in their workplace. More than 91% said they felt that the future introduction of EIC technologies into their workplace would have some positive or a very positive effect. These indications are striking because most Air Force members are facing great uncertainty in their military careers. With large-scale restructuring and down-sizing of the force, many military members stand to lose their jobs or see a reduction in benefits. Yet, in spite of great uncertainties, Air Force visual information (VI) professionals seem to have maintained a "positive-can-do" attitude. This same positive trend came across in data measuring user acceptance of the EIC technologies. Almost 62% of the respondents had a high level of acceptance of these systems. Another 32% reported a medium level of acceptance, while only 6% had low acceptance. This very positive response to new imaging technology may indicate that some Air Force managers have oversold the benefits of electronic imaging technology.

Nevertheless, an overall positive attitude by Air Force VI professionals should help increase the chances of successfully implementing these technologies.

The data collected from this study relating to the demographic profile of Air Force VI professionals revealed that 28% of the respondents were female and 72% were male. Most respondents had ten years or less of government service (68%). The average enlisted rank was a Sergeant (E-4) while the average civilian rank was a level eight (GS-8). Visual Information (VI) professionals averaged three months more time of government service than they had in their VI career area. This difference could equate to the time most respondents spent in boot camp and/or technical school. The break-out by VI specialty was graphic/presentation specialist (53%), photographer (36%), supervisor (6%), civilian employee (4%), and commissioned officer (1%). Of the 84 respondents who reported having some supervisory duties, 58% of them supervised five or less people. As expected, most Air Force VI professionals had attended at least some college (60%). About 14% had college degrees while 2% had completed a graduate degree.

Conclusions

The main research question asked by this study was "How does using new imaging technology affect a media professional's self-reported job satisfaction, job diversity, and their attitude toward change in the workplace?"

Sub-Questions

(1) Do media professionals who use more electronic imaging technologies have greater job diversity, job interest and job satisfaction than comparable media professionals who use them less or not at all?

(2) Do media professionals who use more electronic imaging technologies have a more positive attitude toward change than comparable media professionals who use them less or not at all?

(3) Does the quality and amount of training provided for new systems affect a media professional's acceptance of new technology?

(4) Does a participatory management style increase user acceptance of electronic imaging technologies more than using an autocratic style?

(5) Does the "user friendliness" of new electronic imaging systems affect the acceptance of that technology by media professionals?

Conclusion 1

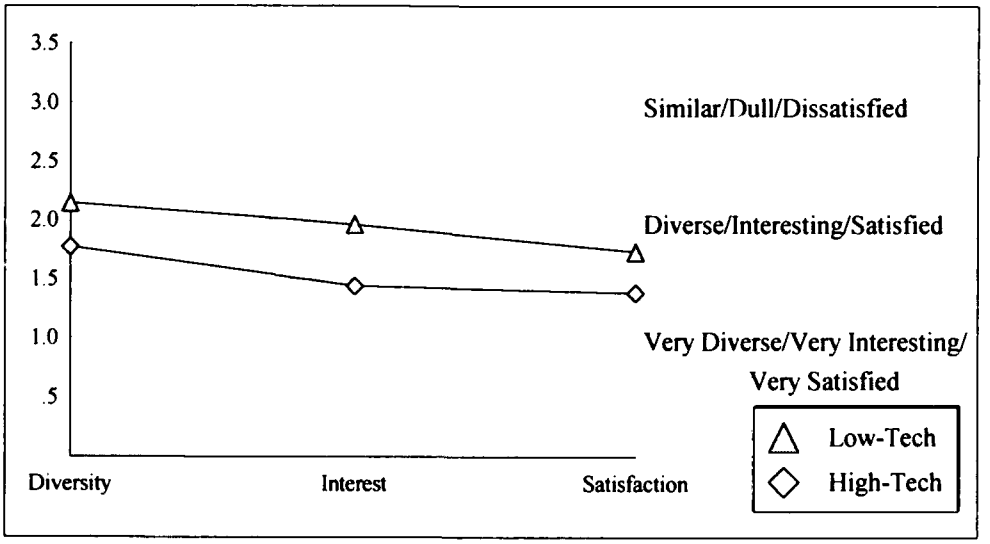
Based on data collected during this study, the researcher concludes that *media professionals who use more electronic imaging technologies have greater job diversity, job interest and job satisfaction than comparable media professionals who use them less or not at all.* Data analysis suggested an overall positive relationship between higher usage of electronic imaging technologies and greater job diversity, interest and job satisfaction. This interrelationship should be good news for visual information (VI) professionals currently working at base VI centers. It means that as more electronic

imaging systems are introduced to the workplace, users will experience greater job diversity, job interest, and job satisfaction.

Air Force (VI) professionals sampled in this study were divided into two groups (high-tech and low-tech) by the amount of electronic imaging center (EIC) technology used in their job. The high-tech group reported greater job diversity (36% very diverse vs. 19% for low-tech), more interesting jobs (56% very interesting vs. 22% for low-tech), and greater job satisfaction (62% very satisfied vs. 38% for low-tech). All of these results were shown to be statistically significant with a population confidence level of +/- 7.4%. Figure 13 below illustrates the statistical relationship of these variables as found in the research sample:

Figure 13.

Comparison of Low and High-tech Means by Diversity, Interest, and Satisfaction



Conclusion 2

Based on data obtained in this study, the researcher concludes that *media professionals who use more electronic imaging technologies have a more positive attitude toward technologically-driven change than comparable media professionals who use them less or not at all.* Statistical evidence points to an overall positive relationship between higher usage of electronic imaging technologies and a positive attitude toward future changes brought about by electronic imaging center (EIC) technologies. As mentioned in conclusion 1 above, Air Force VI professionals were divided into two groups (high-tech and low-tech) by the amount of electronic imaging center (EIC) technology used while doing their job. The high-tech group reported a more positive attitude toward EIC-caused change (74% very positive effect vs. 45% for low-tech) this result was statistically significant with a population confidence level of +/- 7.7%. A similar result was obtained for attitudes toward future change in general. As before, the high-tech group reported a more positive attitude toward future change (73% improve a great deal vs. 43% for low-tech group). However, the T-test of significance for future change (p=0.051) was above the confidence level required to reject the null hypothesis. Therefore, the researcher limited the above conclusion to name a positive correlation between the amount of imaging technology used and technology-driven future change, rather than future change in general.

Conclusion 3

Evidence collected by this study indicates that *as the amount of training provided for new systems increases, the media professional's acceptance of the new technology*

increases. This positive linear relationship is statistically significant for both resident expert/OJT and self-teaching (see Figures 8 & 9). While there is no clear correlation for other forms of training such as seminars or tutorials, the researcher suspects that this correlation may even be stronger for more formal types of training such as courses and seminars. The lack of a statistical relationship in this study may be due to the low numbers of respondents using these types of training. It is likely that the extremely high reliance on self-teaching contributed to the overall reported low quality of training for EIC systems. However, one strength of expert/OJT and self-teaching is that both are more "learn-it-by-doing-it" teaching methods than the other methods surveyed (course/seminar, other outside, and tutorial). This "hands-on" experience may then have increased system familiarity; and this familiarity may have enhanced user acceptance.

Conclusion 4

No conclusions can be drawn from the study data that dealt with participatory vs. autocratic management. While the data suggests that Air Force visual information (VI) professionals who have greater decision-making authority also have higher EIC acceptance levels, the correlation is not statistically significant. The researcher may not have designed the management questions in a way that adequately measures participatory management style. Another possible reason for the lack of statistical significance is that very few respondents reported their supervisors using authoritarian management. Only 15% of the sample said that they had very little or no input into the decision-making process at work. Only 5% of the sample said they could only do

things their supervisor's way or they had to clear every decision through him/her. The overwhelming use of a participatory management style may not have provided a large enough sample of autocratic style management to statistically compare the two. A final factor that may have effected the measurement of management style is the difference between military and civilian work-forces. The Air Force work environment has always stressed military leadership and followership skills. This means that visual information (VI) specialists are "airmen" first, and photographers, etc., second. Because of the military environment, Air Force VI professionals might have responded more favorably to an autocratic type of leadership (management) than would audiovisual workers in a private civilian environment. If this were true, than it would have been very difficult to measure any difference between participatory management and autocratic management in terms of employee acceptance of electronic imaging center (EIC) technologies.

Conclusion 5

Based on data obtained in this study, the researcher concludes that *as the perceived user friendliness of new electronic imaging systems increases, the media professional's acceptance of that technology also increases.* Statistical evidence points to an overall positive relationship between greater user friendliness and higher levels of electronic imaging center (EIC) acceptance (see figure 9). Of those reporting their EIC systems as "very friendly," 82% reported high acceptance. Those reporting their EIC systems as "friendly" had 53% high acceptance and those reporting "unfriendly" had 57% high acceptance. The population confidence level for this data was +/- 8.6%.

The most significant improvement of acceptance level occurred when the EIC systems were rated as "very friendly." This suggests that those electronic imaging systems which provided the very best user-interface also had the most positive effect on acceptance of future systems. One possible explanation is that Air Force visual information (VI) professionals tended to accept technology if it was "very user-friendly" because they knew they had to teach themselves how to use it. Therefore, the more user-friendly a system was, the easier it was to learn-by-doing.

Recommendations

Recommendations Made for Further Study

In reviewing the outcome of this study, several questions can be raised that require further study. One area is the relationship between management style and acceptance of new electronic imaging technologies. Perhaps a case study of organizations implementing the same imaging technology but with different levels of success could examine the management style used. Further study is needed to determine what effect management style has on user acceptance of new electronic imaging systems.

Further study is also needed concerning the relationship between training and user acceptance of electronic imaging systems. One research method that could be used is an experimental model which will pre and post-test the attitude of media professionals. Researchers could measure the relative impact each type of training had on user acceptance as well as system proficiency. With this information, media

managers could better allocate their organizational resources for training on new systems.

Finally, further study is needed concerning the relationship between system training and the perceived user friendliness of electronic imaging systems. It seems possible that good training would increase a media professional's perception of a new system as being user friendly. The data in this study has already shown that perceived user friendliness is positively correlated with user acceptance of new systems. Therefore, if training can increase perceived system user friendliness, it should also increase user acceptance. This two-fold relationship is difficult to pin down. Perhaps an experimental design with pre and post-implementation measurements could identify a correlation between these variables.

Recommendations Derived from the Data

The proposed electronic imaging center (EIC) concept calls for up to $40 million dollars and considerable manpower to be expended over the next four years. The primary benefit of implementing the EIC concept is promised future cost saving through increased productivity. The present study does not address these aspects of the proposed wholesale conversion to electronic imaging--instead, it focuses on the human aspect of implementing the EIC. The researcher hopes this study can help Air Force decision makers better understand the interrelationship between new electronic imaging systems, training, work environment, and the attitudes of those who operate EIC systems. This understanding should then be applied to implement the electronic imaging center (EIC) concept in a way that derives maximum benefit. Since the EIC

cost savings come primarily by increasing the productivity of visual information (VI) professionals, the reaction of those professionals will make or break the program. The researcher wishes to make two overall recommendations concerning the large-scale implementation of the EIC concept in the Air Force. These recommendations are: (1) proceed with due-caution, and (2) proceed deliberately.

Proceed With Caution

The data gathered by this study reveals several key points suggesting caution while proceeding with the EIC concept. First, the weakest area thus-far in implementing new imaging technologies is training. Over 58% of the survey respondents said the quality of their training had been just adequate, less than adequate, or very inadequate. Of all the types of training measured, 97% of the respondents used self-teaching to learn their EIC systems. Self-teaching is not a ideal way to train people to use new systems. Because training was a problem for the small-scale EIC test and at a few other locations, it is likely to become a huge problem during large-scale implementation. Considering the high cost and complex nature of these new imaging systems, better training is a must. Another factor which complicates training is that many of the EIC technologies are cutting-edge--there simply are not any formal training programs available for them. This lack of available training should make planners very cautious about deploying a new imaging system on a world-wide basis.

Another key point which suggests using caution is the surprisingly low diffusion of electronic imaging technologies at the four EIC test locations. Many respondents

from these locations are still using only a few EIC technologies. Only 40% of the VI professionals at the four test locations were rated as being in the study's high-tech group. Almost one in three of the test location respondents used fewer electronic imaging technologies than the average professional at a regular base VI center. This suggests that the EIC test locations have not been able to switch 100% to new imaging technologies. This result leaves some doubt as to whether the entire Air Force could convert to all-electronic systems in just a four years.

A third key point which suggests caution is the unrealistically high expectations visual information (VI) professionals have for new imaging technologies. A vast majority of respondents who used little or no electronic imaging center (EIC) technologies still expressed a very strong belief that these systems would help them work faster, improve their job performance, increase their productivity, enhance their effectiveness, and make their job easier. Air Force VI personnel appear to perceive new technology as the simple answer to complex issues. These overly optimistic expectations could lead to future problems if VI professionals find that the EIC systems are not everything they thought they would be.

Proceed Deliberately

Based on the results of this study, there are several strategies which may help achieve the desired benefits of the EIC concept. To begin with, new imaging technologies should be introduced on a smaller scale first. Perhaps a single new imaging technology should be implemented first. Other EIC technologies should be phased in after the first systems are successful. This more narrow approach would

allow planners to apply new technology to job areas that would benefit most from electronic imaging. In addition, this study has shown that a positive experience with one or more electronic imaging technology will increase the acceptance of future systems. On the other hand, if all the EIC systems were fielded simultaneously, VI professionals would be certain to have negative technology-related experiences. By fielding the EIC in well planned phases, system training could be improved and the process could be amended whenever needed. If training could be improved, the acceptance and perceived user friendliness of EIC systems would also be enhanced.

Air Force planners should not oversell electronic imaging technology. The implementation process can be promoted most effectively by sharing both good and bad experiences with everyone in the field. It is important for people have a positive *and* realistic view of technology. This view helps produce the benefits of new imaging technologies while allowing for acceptance of *minor* negative aspects as well. The study data shows that imaging technologies which are successfully implemented help users to accept other technologies--there is no need for a "hard-sell."

Successfully incorporating electronic imaging systems into base visual information (VI) centers will be good for VI professionals in the long-run. These new electronic imaging systems will increase job diversity, interest, and satisfaction. The question is how do we best go about incorporating electronic imaging center (EIC) technologies into Air Force base VI centers. A better understanding of how these new imaging technologies impact VI professionals can help to answer this question.

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Survey of Air Force Visual Information (VI) Personnel

Approximate time to complete: 10 minutes

The purpose of this survey is to gather information about the use and acceptance of new electronic imaging systems among VI personnel. Your participation in this effort will help us learn more about the impact of new technology on media personnel. Your input is very important to us--however, your replies are entirely voluntary and will be held in strict confidence. Many of the survey questions will ask you to note attitudes and feelings. Please feel free to express your opinions and judgements. Information collected from individuals for this study will not be identifiable in the final report. Please place your survey in the attached postage paid envelop and mail it to the *Walter Cronkite School of Journalism and Telecommunications, Arizona State University*. Research results may be released to the public and the AF Human Resources Lab.

Part 1

This section of the survey asks you for your opinions about your job, your impression of changes to your work environment, your outlook for the future, and your assessment of management issues which affect your job.

1. How would you rate your satisfaction with the job you are now doing in Visual Information? Would you say you are:
   (a)_____ very satisfied?
   (b)_____ satisfied?
   (c)_____ dissatisfied?
   (d)_____ very dissatisfied?

2. When you consider the variety of tasks you perform in your present job, would you say that these tasks are:
   (a)_____ very diverse?
   (b)_____ diverse?
   (c)_____ similar?
   (d)_____ very much alike?

3. Consider the nature of the projects you have accomplished in your present job. Overall, would you say they have been:
   (a)_____ very interesting?
   (b)_____ interesting?
   (c)_____ dull?
   (d)_____ very dull?

4. Think about the changes you have seen in your work place in the past few years. What effect would you say these changes have had on the conditions of your work place? Have they made conditions:
   (a)_____ very improved?
   (b)_____ somewhat improved?
   (c)_____ no different?
   (d)_____ somewhat worse?
   (e)_____ much worse?

5. More changes are being planned for the future. In your opinion, what effect will these future changes have on you work conditions? Will future changes:
   (a)_____ improve work conditions a great deal?
   (b)_____ improve work conditions somewhat?
   (c)_____ make no difference in work conditions?
   (d)_____ make work conditions somewhat worse?
   (e)_____ make work conditions much worse?

18. Air Force VI leaders have proposed converting from traditional ways of producing and displaying audiovisual materials to all electronic systems. This proposal is know as the Electronic Imaging Center (EIC). How familiar would you say you are with the EIC concept? Are you:

(a)_____ very familiar?
(b)_____ somewhat familiar?
(c)_____ somewhat unfamiliar?
(d)_____ very unfamiliar?

19. Based on what you know about the Electronic Imaging Center concept, how do you feel about the future introduction of these technologies into your work place? Overall, do you think:

(a)_____ it will have a very positive effect?
(b)_____ it will have some positive effect?
(c)_____ it will have some negative effect?
(d)_____ it will have a very negative effect?

Indicate whether you agree or disagree with the following statements. Circle the number that best describes your opinion (1=strongly disagree to 9=strongly agree). Please provide your opinion regardless of how little you may know about specific systems. We are interested in what you think of new imaging technologies in general and the proposed changes.

	Strongly Disagree								Strongly Agree
20. The new imaging technologies will enable me to finish tasks more quickly.	1	2	3	4	5	6	7	8	9
21. Using new imaging technology will improve my job performance.	1	2	3	4	5	6	7	8	9
22. Using new imaging technology will increase my productivity.	1	2	3	4	5	6	7	8	9
23. Using new imaging technology will enhance my effectiveness on the job.	1	2	3	4	5	6	7	8	9
24. Using new imaging technology will make it easier to do my job	1	2	3	4	5	6	7	8	9
25. Overall, I expect to find the new imaging technologies useful in my job.	1	2	3	4	5	6	7	8	9

Part 4: Demographic Data

26. Year you entered government service _____ 27. Your present grade (E?, GS?) _____

28. Years of visual information experience _____ 29. Your AFSC _____

30. Number of people you supervise _____ 31. Your Gender (M or F) _____

32. Please circle the amount of formal education you have completed:

(a). High school or less (b). Some college (c). College graduate (d). Post graduate degree

Please take a moment to put your survey into the enclosed postage-paid/pre-addressed envelop and then place it in outgoing "distribution" or a mailbox. Your input is important.

Thank you for your help!

USAF SCN#93-22 Expires 1 Jun 93 (01)

Arizona State University

Walter Cronkite School of Journalism and Telecommunication
Tempe, Arizona 85287-1305
(602) 965-5011

March 1, 1993

Dear Media Professional,

We are presently conducting research into the use and acceptance of new electronic imaging systems by Air Force media professionals. Your position as an Air Force Visual Information Specialist, Still Photographer, or VI Manager provides us a unique opportunity to study the impact of this new media technology on you and your job. Government media organizations such as yours often lead the way with technology and innovation. Whether your organization is already using new imaging technology, or if it's still in the planning stages, you can make a valuable contribution to our research. Please take a few minutes to complete the attached survey and then place it in the envelop provided.

My point of contact for this survey is Major Lee Thomas (602) 820-5213. The Air Force approved survey control number is USAF SCN#93-22. Your input will make a difference--thank you for helping.

John E. Craft, Ph.D.
Associate Professor

Lee E. Thomas
Major, USAF

Please Note: This research effort has been approved by HQ AFMPC, AFIT/XP, ACC/SCXV, PACAF/PH and AFSOC/PH.

Data Required by Privacy Act of 1974
AUTHORITY: AFR 178-7 and AFR 30-23.
PRINCIPLE PURPOSE: Used to gather data for research.
ROUTINE USE: To be used by ASU researchers to evaluate the use and acceptance of electronic imaging systems by Air Force VI Specialists.
DISCLOSURE: Participation and disclosure by participants is on a voluntary basis.

Arizona State University

Walter Cronkite School of Journalism and Telecommunication
Tempe, Arizona 85287-1305
(602) 965-5011

FROM: Maj Lee E. Thomas
2336 W. Nopal Ave.
Mesa, AZ 85202
(602) 820-5213

20 Jan 1993

SUBJECT: Request for Survey Approval

TO: AFIT/CIRK
Maj Rosenbaum

1. I have forwarded the attached survey documents in accordance with AFITR 53-1 for your review and assistance. As you may recall, my major project involves research using a survey instrument of Visual Information (VI) personnel. I have tested and revised the survey to implement changes suggested by my research committee and VI technicians. I have also begun a dialog with the VI community and staff in preparation for administering it.

2. I am grateful for your support and timely review. As with all AFIT students, I am working to meet my program deadlines while still engaging a meaningful and challenging subject. I know you are busy and see a lot of these things. Any suggestions and help that you can lend me in this survey approval process will be much appreciated.

LEE E. THOMAS
Major, USAF

3 Atch
1. Request for Approval
2. Survey Instrument
3. Letter to Respondents

Request for Survey Approval

Title of Survey: Survey of Air Force Visual Information (VI) Personnel

Requestor Information: Major Lee E. Thomas
2336 W. Nopal Ave.
Mesa, AZ 85202
Ph: (602) 820-5213

Statement of Survey Purpose: The purpose of this survey is to gather information about the use and acceptance of new electronic imaging systems among visual information (graphics & photo) personnel. The researcher will use the data to examine the theoretical relationship between new imaging technologies and end user job diversity/satisfaction. The researcher will also seek to correlate the user's attitude toward change with successful media technology implementation. Finally, user sentiment will be correlated with the training provided, management style, and ease of use of the new imaging systems to determine which of these variables has a significant effect on the users attitude toward change.

Justification: Media managers today are looking to new imaging technologies to help them improve service and increase efficiency. To succeed, they must understand the effect these technologies have on their people. A improved grasp of how new electronic imaging technologies influence job diversity and satisfaction can help managers make needed changes in less time. Knowing the relative influence of training, management style, and "user friendliness" upon user attitudes can help VI managers promote innovation with less cost to the Air Force. This survey and associated research will also satisfy the requestor's degree requirements at Arizona State University, under the AFIT Civilian Institutions program.

Preferred Administrative Time: The researcher desires to conduct the survey between 1 March and 1 May 1993.

Hypotheses to be Tested by Survey

H_1 Media professionals in organizations that have successfully implemented new imaging technologies have greater job diversity and job satisfaction than professionals in organizations using traditional media technologies.

H_2 Media professionals in organizations that have successfully implemented new imaging technologies have a more positive attitude toward change than professionals in organizations using traditional media technologies.

H_3 The quality and amount of training provided is positively correlated to user acceptance of new media technologies.

Hypotheses (Continued)

> **H_4** A participatory management style is positively correlated to user acceptance of new media technologies while a top-down management style is negatively correlated.

> **H_5** The "user friendliness" of a new media technology is positively correlated to user acceptance of that technology.

Proposed Statistical Analysis Plan: Survey data will be entered into a data file and statistically analyzed using the *Statistical Package for the Social Sciences (SPSS)* software. The following narratives address the planned methodology for testing the null hypothesis of each hypothesis. These measures are intended to satisfy the main research objectives. The narratives are not meant to be comprehensive step-by-step schema; but a brief synopsis of the methodology to be used. The researcher will conduct other crosstabs and tests of significance as needed or when directed by the thesis committee.

For H_1: The successful implementation of new imaging technologies by surveyed organizations will be addressed in two ways. First, respondents from Hurlburt, Barksdale, Elmendorf and Eielson AFBs will be classified as users from organizations which have implemented new imaging technology. (These four bases were part of the *Electronic Imaging Center (EIC)* test in 1992. They are known to make extensive use of new imaging technologies). Second, survey question #9 will be used to classify respondents into two groups: those with extensive new imaging systems and those with limited new imaging systems. Respondents from the four test bases and those with extensive new imaging systems will be crosstabulated with respondents having only limited new imaging systems. Tests for differences between the sub-group's job satisfaction and diversity will be performed by crosstabulating them with survey questions #1, #2 and #3. Appropriate tests of significance will be conducted to affirm whether the null hypothesis my be rejected or not. The statistical confidence level will be 95% before this or any other null hypothesis may be rejected.

For H_2: Respondents will be grouped in the same manor as used in H_1 above (*EIC bases,* extensive and limited imaging systems). Testing for differences between the sub-group's attitude toward change will be performed by crosstabulating them with survey questions #5 and #19. Appropriate tests of significance will be conducted to affirm whether the null hypothesis my be rejected or not.

For H_3: User acceptance of new media technology will be measured by the respondent's answers to survey questions #20 to #25. These six questions were developed by researchers studying data automation to measure end user acceptance of new technology based on the "perceived usefulness" of systems. A mathematical mean for this group of six questions will be calculated for each respondent. To test for correlations between training and end user acceptance of new imaging technologies, crosstabulations will be made between survey

questions #10 and #11, with the above mentioned mean (of questions #20 to #25). Tests of significance will be performed to see if the null hypothesis may be rejected or not.

For H_4: User acceptance of new technology will be measured in the same manner as H_3 above. Tests for correlations between participatory management style and end user acceptance of new imaging technologies will be made by crosstabulations between survey questions #6 and #7, with the user acceptance mean (of questions #20 to #25). Tests of significance will be performed to see if the null hypothesis may be rejected or not.

For H_5: The "user friendliness" on new imaging technology will be measured by the respondent's answers to survey questions #12 to #17. These six questions were also developed by researchers studying data automation to measure end user acceptance of new technology based on the "perceived user friendliness" of systems. A mathematical mean for this group of six questions will be calculated for each respondent. Once again, user acceptance of new technology will be measured as in H_3 and H_4 above. Tests for correlations between these two elements will be made by a crosstabulation between the mathematical mean of user friendliness (survey questions #12 to #17), with the user acceptance mean (survey questions #20 to #25). Tests of significance will be performed to see if the null hypothesis may be rejected or not.

Other Proposed Analysis: Several additional questions are included in the survey to gather useful data. Since these questions address exploratory areas, no specific hypotheses are made in advance. Question #4 will be used to measure the relationship between a respondent's opinion of past changes and their attitude toward future changes (questions #5 and #19). Question #8 was requested by the thesis committee to examine the relationship between a supervisor's perceived management style and the perceptions of workers from the same unit. Question #18 is intended to measure how comfortable the respondents are with the amount of information they have received on the Air Force's *Electronic Imaging Center (EIC)* concept. It will also provide feedback to HQ USAF/SCMV and MAJCOM VI managers on their efforts to inform the ranks of the coming changes. Questions #26 to #32 (demographic data) will be used to group respondents by their experience level, rank, skill area, status as supervisors or worker, gender, and educational level. This demographic data may reveal important differences between the various groups and their use and acceptance of new imaging technology.

Description of Population to be Surveyed: The population will include all those in the Air Force Specialty codes 231X2 and 231X1 (both military and civilian). In addition, those personnel in visual information management positions holding AFSC 23199 are included. The following is a break-out of the survey population:

Air Force Specialty Code	Number Authorized
Visual Information Specialist 231X1	640
Still Photographic Specialist 231X2	580
Visual Information Supervisor 23199	45
Total	**1,265***

*Numbers shown are authorizations, actual manning will be lower.

Description of Sample Selected: The sample includes people in Air Force Specialty codes 231X2, 231X1 and 231X99 (both military and civilian). The selected sample represents 21.5% of the population. The following is a break-out of the survey sample:

Air Force Specialty Code	Number Selected
Visual Information Specialist 231X1	137
Still Photographic Specialist 231X2	123
Visual Information Supervisor 23199	12
Total	**272***

*Numbers shown are authorizations, actual manning will be lower.

Method of Sample Selection: The sample was acquired by selecting 16 base visual information centers by location. The first four bases were selected because of their participation in the *EIC* test mentioned earlier. Under this test program, each of these locations received between $^1/_4$ and $^1/_2$ million dollars of new electronic imaging equipment, training and installation. These four bases, (Hurlburt, Barksdale, Elmendorf and Eielson), have since made basic changes to work procedures and personnel utilization because of these new technologies. The researcher wishes to compare user responses from these four locations with those from locations using more traditional work procedures and technology. Therefore, the remaining 12 locations were selected using a random number table from the 29 base VI centers of the Air Combat Command (ACC). ACC was selected as the source command for the remaining locations for three reasons: (1) Overall, ACC base VI centers use more traditional imaging systems and procedures than any other Air Force command. This makes them a good source to compare with VI centers using new electronic imaging systems. (2) ACC has more continental U.S. bases than any other A.F. command. This allows for a more random selection process, thereby enhancing the validity of statistical research. (3) Using a single command for 13 (with Barksdale) of the 16 locations will help to simplify the survey management and approval process. The following table lists the sample locations along with a suggested point of contact:

LOCATION	MAJCOM	POINT OF CONTACT	DSN NUMBER
Barksdale AFB LA	ACC	TSgt Sandra Murray	781-4203
Beale AFB CA	ACC	SMSgt Michael Rittgers	368-2161
Davis-Monthan AFB AZ	ACC	MSgt Joseph Fallon	361-5114
Eielson AFB AK	PACAF	MSgt Frank Garzelnick	317- 377-3389
Ellsworth AFB SD	ACC	CMSgt James Wicker Jr	675-1056
Elmendorf AFB AK	PACAF	CMSgt Quinton Mitchell	317-552-3029
Grand Forks AFB MD	ACC	MSgt Thomas Jennings	362-4130
Hurlburt Fld FL	AFSOC	TSgt Kala Prewitt	579-6267
K I Sawyer AFB MI	ACC	SSgt Greg Jeffers	472-2828
Langley AFB VA	ACC	Capt Randy Robertson	574-2683

Luke AFB AZ	ACC	CMSgt Terrance Gaffney	853-7030
McConnell AFB KS	ACC	MSgt Robert Rodriguez	743-3700
Nellis AFB NV	ACC	Maj Douglass Dotson	682-7869
Offutt AFB NE	ACC	CMsgt Edward Franz Jr	271--6792
Seymour Johnson AFB NC	ACC	SMSgt Larence Smar	488-6842
Shaw AFB SC	ACC	CMSgt George Scott	965-2004

Method of Conducting Survey: The enclosed copies of the proposed survey have been approved by the thesis committee chair; Dr. John Craft. Once Air Force approval is received, the researcher plans to contact the 16 locations to secure a unit point of contact (POC) and the current manning count. A packet containing the correct number of surveys will be sent to the POC of each unit. The POCs will be asked to distribute a survey "kit" to each member of the sample. A "kit" will included (1) a brief letter introducing the survey, (2) the survey itself, (3) and a pre-addressed and stamped envelop for mailing back to the researcher. The respondents themselves will be asked to seal their surveys in the envelop and place them in the mail. This will help to assure confidentiality and openness in the responses.

Method of Tabulating Results: Survey answers will be assigned numeric values and entered into standard data fields using the *SPSS* "collect" function. The researcher will score each returned survey and enter the data using the following code book:

Question #	Name	Field(s)	Value Range
NA	Survey Number	1 to 3	001-200
NA	Respondent's Unit	4 & 5	1-16
1	Job Satisfaction	6	1-4
2	Job Diversity	7	1-4
3	How Interesting?	8	1-4
4	Past Changes	9	1-5
5	Future Changes	10	1-5
6	How Much Control?	11	1-4
7	Worker: How Much Input?	12	1-4
8	Boss: How Much Input?	13	1-5
9	Current Use of EIC Sys.	14 &15	0-40
10a	Tutorial	16	0-5
10b	Course/Seminar	17	0-5
10c	Resident Expert/OJT	18	0-5
10d	Self Teaching	19	0-5
10e	Other Outside	20	0-5

Question #	Name	Field(s)	Value Range
11	Training Quality	21	1-5
12	Easy to Learn	22	1-9
13	Easy to Get Them to do	23	1-9
14	Easy to Understand	24	1-9
15	Flexible to Interact With	25	1-9
16	Easy to Become Skillful	26	1-9
17	Overall Easy to Use	27	1-9
18	How Familiar with EIC?	28	1-4
19	Future Effect of EIC	29	1-4
20	Do Tasks More Quickly	30	1-9
21	Improve Job Performance	31	1-9
22	Increase Productivity	32	1-9
23	Enhance Effectiveness	33	1-9
24	Make Job Easier	34	1-9
25	Overall Useful in Job	35	1-9
26	Year Entered Service	36 &37	00-93
27	Present Grade	38 & 39	1-15
28	Years of VI Experience	40 & 41	1-50
29	AFSC	42	1-4
30	People You Supervise	43 & 44	00-99
31	Gender	45	1-2
32	Educational Level	46	1-4

Use and Disposition of Results: Research results will be incorporated into a written document and submitted as an applied project in satisfaction of degree requirements at Arizona State University. A copy will be kept at the *Walter Cronkite School of Journalism and Telecommunications*. The research is releasable to the public and the Air Force Human Resources Laboratory. Portions of the research results may be submitted to academic journals for review and publication .

Estimated Cost of Survey:

Unit POC Time:	1 hour x	16ea	x $30 hour	= $ 480
Respondent Time:	15 min x	190ea*	x $30 hour	= $1,425
			Estimated Total:	$1,905

*Based on 70% return rate of surveys-actual will probably be lower.

Availability of Data From Other Sources: This data in not available from any other known source.

Command Approval Request: The requester seeks command approval for conducting this survey at the earliest opportunity. Permission is needed to contact the selected Air Force units for the purpose of obtaining unit POCs, having them distribute survey "kits," and for unit personnel to complete the survey and put it in the mail. The following is a list of the commands and suggested points of contact:

Command/Off Symbol	Location	Point of Contact	DSN Number
HQ USAF/SCMV	Pentagon, DC	Lt Col William Cultice	225-9610
HQ ACC/SCXV	Langley, VA	Lt Col Jon Evans	574-7051
HQ PACAF/SCMV	Hickam, HI	Lt Col David Levy	449-5142
HQ AFSOC/SCL	Hurlburt, FL	MSgt Thomas Cobb	579-2462

Arizona State University

Walter Cronkite School of Journalism and Telecommunication
Tempe, Arizona 85287-1305
(602) 965-5011

FROM: Maj Lee E. Thomas
2336 W. Nopal Ave.
Mesa, AZ 85202
(602) 820-5213

29 Jan 1993

SUBJECT: Request for Assistance and Survey Sponsorship

TO: HQ USAF/SCMV
Lt Col Cultice

1. My research project here at ASU is beginning to pick up steam. With a little help from my friends, I may even complete this thing and graduate! Right now I could use your help in getting MAJCOM permission to conduct my survey. It seems that before I can officially get started, I must have two things; "command sponsorship" and a "survey control number." (More about the survey control number later). My present request is for your office to send the enclosed packages to ACC, PACAF, and AFSOC for their consideration. By sending them from AF/SCMV, you will be giving Air Staff sponsorship to my research. The draft packages will request MAJCOM permission to conduct the survey. My hope is that your sponsorship will smooth out the command approval process and help give the project a little needed *umph*!

2. I expect to receive a survey control number by mid-February. I have attached an information copy of my request for survey approval--(which AFIT and MPC are now processing). In the meantime, I am pursuing the command sponsorship issue. Please have someone review the draft letters and attachments to be sent to each of the three commands. (I have included Mr. Dabney's name on the draft letters as the SCMV point of contact--*payback for those bad coffee jokes*--but you may want to name someone else). If there are any questions or comments, I am ready to respond on short notice. As always, I'm grateful for your support and input. Everyone there has been very helpful. I hope to bring something of value to the VI community from this effort.

LEE E. THOMAS
Major, USAF

3 Atch
1. 3ea Command Sponsor Pkg. w/atch
2. Draft Survey Instrument
3. Copy of Request for Approval

SCMV

Request for Command Sponsorship of VI Survey

HQ ACC/SCXV

1. Our office is sponsoring a research project by Maj. Thomas (AFIT/CIRK) and *Arizona State University* (ASU) to study the use and acceptance of new electronic imaging systems among visual information professionals. Maj. Thomas has requested permission to send surveys to 231X1, 231X2 and 23199 personnel at 13 of your base VI centers. This survey will be a one-time event and the participation of individual respondents is voluntary. Your approval for Maj. Thomas to conduct survey research at the following ACC locations is requested:

LOCATIONS		
Barksdale AFB, LA	K I Sawyer AFB, MI	Offutt AFB, NE
Beale AFB, CA	Langley AFB, VA	Seymour Johnson AFB, NC
Davis-Monthan AFB, AZ	Luke AFB, AZ	Shaw AFB, SC
Ellsworth AFB, SD	McConnell AFB, KS	
Grand Forks AFB, MD	Nellis AFB, NV	

2. ACC command sponsorship of this research by 15 Feb 93 will allow Maj. Thomas to contact each location by phone, set up a unit point of contact, and send the needed number of survey kits. Maj. Thomas will also provide each respondent with a stamped envelop for returning their survey to ASU. A sample survey and command sponsorship letter are attached. AF/MPC approval for the survey is pending. My POC for this project is Mr. Ray Dabney, DSN: 225-9610. ASU POC is Maj. Lee Thomas, commercial phone: (602) 820-5213.

WILLIAM W. CULTICE, Lt Col, USAF
Chief, Visual Information Division
Deputy Chief of Staff for Command, Control
Communications and Computers

cc: Maj. Thomas
2 Atch
1. Sample VI Survey
2. Sample Command Sponsor Ltr

SAMPLE COMMAND SPONSORSHIP LETTER

SCXV

Request for Command Sponsorship of VI Survey (Your Ltr dated XX Feb, 93)

HQ USAF/SCMV

As you requested, Air Combat Command (ACC/SCXV) agrees to sponsor Maj. Thomas' research on the use and acceptance of new imaging systems by visual information personnel. This sponsorship grants permission for Maj. Thomas to contact the referenced 13 ACC VI centers, obtain a unit POC, and to send surveys to the appropriate personnel. It is understood that individual participation is voluntary. Our MAJCOM point of contact is XXXXXXX.

cc: Maj. Lee E. Thomas
2336 W. Nopal Ave.
Mesa, AZ 85202

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D.C.

11 FEB 1993

FROM: HQ USAF/SCMV

SUBJ: Request for Command Sponsorship of VI Survey

TO: HQ ACC/SCXV

1. HQ USAF/SCMV is sponsoring a research project by Maj Thomas (AFIT/CIRK) and *Arizona State University* (ASU) to study the use and acceptance of new electronic imaging systems among visual information professionals. Maj Thomas has requested permission to send surveys to 231X1, 231X2 and 23199 personnel at 13 of your base VI centers. This survey will be a one-time event and the participation of individual respondents is voluntary. Request approval for Maj Thomas to conduct survey research at the following ACC locations:

LOCATIONS		
Barksdale AFB, LA	K I Sawyer AFB, MI	Offutt AFB, NE
Beale AFB, CA	Langley AFB, VA	Seymour Johnson AFB, NC
Davis-Monthan AFB, AZ	Luke AFB, AZ	Shaw AFB, SC
Ellsworth AFB, SD	McConnell AFB, KS	
Grand Forks AFB, MD	Nellis AFB, NV	

2. ACC command sponsorship of this research by 15 Feb 93 will allow Maj Thomas to contact each location by phone, set up a unit point of contact, and send the needed number of survey kits. Maj Thomas will also provide each respondent with a stamped envelope for returning their survey to ASU. A sample survey and command sponsorship letter are attached. AFMPC approval for the survey is pending. My POC for this project is Mr. Ray Dabney, DSN 225-9610. ASU POC is Maj Lee Thomas, commercial (602) 820-5213.

3. Thank you for your assistance on this important survey.

WILLIAM W. [illegible], Lt Col, USAF
Chief, Visual [illegible]
Directorate of [illegible]
DCS/Command, Control, Communications, and Computers

2 Atch
1. Sample VI Survey
2. Sample Command Sponsor Ltr

cc: Maj Thomas

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D.C.

11 FEB 1993

FROM: HQ USAF/SCMV

SUBJ: Request for Command Sponsorship of VI Survey

TO: PACAF/SCMV

1. HQ USAF/SCMV is sponsoring a research project by Maj Thomas (AFIT/CIRK) and *Arizona State University* (ASU) to study the use and acceptance of new electronic imaging systems among visual information professionals. Maj Thomas has requested permission to send surveys to 231X1, 231X2 and 23199 personnel at 2 of your base VI centers. This survey will be a one-time event and the participation of individual respondents is voluntary. Request approval for Maj Thomas to conduct survey research at Elmendorf and Eielson AFBs.

2. PACAF command sponsorship of this research by 15 Feb 93 will allow Maj Thomas to contact each location by phone, set up a unit point of contact, and send the needed number of survey kits. Maj Thomas will also provide each respondent with a stamped envelope for returning their survey to ASU. A sample survey and command sponsorship letter are attached. AFMPC approval for the survey is pending. My POC for this project is Mr. Ray Dabney, DSN 225-9610. ASU POC is Maj Lee Thomas, commercial (602) 820-5213.

3. Thank you for your assistance on this important survey.

WILLIAM W. [illegible], USAF
Chief, Visual [illegible] Division
Directorate of [illegible]
DCS/Command, Control, Communications, and Computers

2 Atch
1. Sample VI Survey
2. Sample Command Sponsor Ltr

cc: Maj Thomas

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, D.C.

11 FEB 1993

FROM: HQ USAF/SCMV

SUBJ: Request for Command Sponsorship of VI Survey

TO: 834 CS/CC

1. HQ USAF/SCMV is sponsoring a research project by Maj Thomas (AFIT/CIRK) and *Arizona State University* (ASU) to study the use and acceptance of new electronic imaging systems among visual information professionals. Maj Thomas has requested permission to send surveys to 231X1, 231X2 and 23199 personnel at the Hurlburt base VI support center. This survey will be a one-time event and the participation of individual respondents is voluntary. Request approval for Maj Thomas to conduct survey research at the Hurlburt AFB VI center.

2. AFSOC command sponsorship of this research by 15 Feb 93 will allow Maj Thomas to contact each location by phone, set up a unit point of contact, and send the needed number of survey kits. Maj Thomas will also provide each respondent with a stamped envelope for returning their survey to ASU. A sample survey and command sponsorship letter are attached. AFMPC approval for the survey is pending. My POC for this project is Mr. Ray Dabney, DSN 225-9610. ASU POC is Maj Lee Thomas, commercial (602) 820-5213.

3. Thank you for your assistance on this important survey.

WILLIAM [illegible], USAF
Chief, Vi[illegible]
Directorate of [illegible]
DCS/Command, Control, Communications, and Computers

2 Atch
1. Sample VI Survey
2. Sample Command Sponsor Ltr

cc: Maj Thomas

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE, VIRGINIA

22 FEB 1993

FROM: HQ ACC/SCXV
180 Benedict Ave, Suite 209
Langley AFB VA 23665-1993

SUBJ: Request for Command Sponsorship of Visual Information (VI) Survey (Your Ltr, 11 Feb 93)

TO: HQ USAF/SCMV
1250 Air Force Pentagon
Washington DC 20330-1250

1. As you requested, Air Combat Command VI Branch agrees to sponsor Maj Thomas' research on the use and acceptance of new imaging systems by VI personnel. This sponsorship grants permission for Maj Thomas to contact the referenced 13 ACC VI centers, obtain a unit POC, and send surveys to the appropriate personnel. It is understood that individual participation is voluntary.

2. POC is Mr Hillerman, DSN 574-7051.

JON E. EVANS, Lt Col, USAF
Chief, Visual Information Branch
Combat Readiness Division

cc: Maj Thomas
2336 W. Nopal Ave
Mesa AZ 85202

Global Power For America

DEPARTMENT OF THE AIR FORCE

HEADQUARTERS PACIFIC AIR FORCES
HICKAM AIR FORCE BASE, HAWAII 96853 - 5001

FROM: HQ PACAF/SCMV
25 E Street Ste C310
Hickam AFB HI 96853-5409

3 March 1993

SUBJ: Request for Command Sponsorship of VI Survey (Your 11 Feb 93 Ltr)

TO: HQ USAF/SCMV

1. Per subject request, PACAF agrees to sponsor Major Thomas' research on the use and acceptance of new imaging systems by visual information personnel. This sponsorship authorizes Major Thomas to contact any PACAF VI center, obtain a unit POC, and to send surveys to the appropriate personnel. It is understood that individual participation is voluntary.

2. The above information was conveyed to Major Thomas in an early February phone conversation. If you have any questions or need any additional assistance, please contact me at DSN 449-5142, Fax 449-4304.

DAVID J. LEVY II, Lt Col, USAF
Chief, VI Systems Branch
Communications-Computer Systems

cc: PACAF BVIMs w/
Referenced Ltr
Major Thomas

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE SPECIAL OPERATIONS COMMAND (AFSOC)

FROM: 834 CS/CC
325 Tully Street (STOP 41)
Hurlburt Field, FL 32544-5841

24 Feb 93

SUBJ: Request for Command Sponsorship of VI Survey (Your Ltr dated 11 Feb 93)

TO: HQ USAF/SCMV

As you requested, AFSOC/PH (834 CS/CC) agrees to sponsor Maj Thomas' research on the use and acceptance of new imaging systems by visual information personnel. This sponsorship grants permission for Maj Thomas to contact the Hurlburt Field VI center, obtain a unit POC, and to send surveys to the appropriate personnel. It is understood that individual participation is voluntary. Our MAJCOM point of contact is TSgt Triggle, DSN 579-7526.

Dennis R. Pitt

DENNIS L. PITT, Major, USAF
Commander, 834th Communications Sq

cc: Maj Lee E. Thomas
2336 W. Nopal Ave
Mesa, AZ 85202

TSgt Triggle
834 CS/SCV

Arizona State University

Walter Cronkite School of Journalism and Telecommunication
Tempe, Arizona 85287-1305
(602) 965-5011

March 3, 1993

CMSgt Wicker Jr.
Visual Information Manager
121 Signal Drive
Rapid City, SD 57701

Dear CMSgt Wicker Jr.,

Thank you for consenting to be my point of contact for research at Ellswoth AFB. In our phone conversation of March 2nd, you indicated there are 16-X1's, 11-X2's, and 1-00 assigned there including yourself. I have enclosed 28 survey kits so everyone will have a chance to respond. Please help me by giving one to each of your people and encouraging them to participate. This study is sponsored by visual information people *for* visual information people. Everyone's participation will help get important and relevant information back to the highest levels of our career field. However, no one should be pressured to participate--the survey is voluntary. Please encourage everyone who does participate to mail their surveys back by *March 31st.*

This research will study the relationship between new imaging technologies, job satisfaction, and job diversity. It will also look at attitudes toward change and how they may relate to training and management style. I will send you an executive summary once the results have been correlated and analyzed. I also plan to submit a short article about the research to the VITAB newsletter.

If you have any questions I can be reached at (602) 820-5213. I am a VI officer (AFSC 2316) assigned to the AFIT advanced degree program at Arizona State University. My research effort has been sponsored by HQ USAF/SCMV, ACC/SCXV, PACAF/PH and AFSOC/PH. The survey itself and the methodology have been approved by HQ AFMPC and AFIT/XP, ***Thank you for your help, I could not do it without you.***

Sincerely,

LEE E. THOMAS
Major, USAF

SURVEY CODING SCHEME

Question #	Name	Field(s)	Value Range
NA	Survey Number	1 to 3	001-200
NA	Respondent's Unit	4 & 5	1-16
1	Job Satisfaction	6	1-4
2	Job Diversity	7	1-4
3	How Interesting?	8	1-4
4	Past Changes	9	1-5
5	Future Changes	10	1-5
6	How Much Control?	11	1-4
7	Worker: How Much Input?	12	1-4
8	Boss: How Much Input?	13	1-5
9	Current Use of EIC Sys.	14 &15	0-40
10a	Tutorial	16	0-5
10b	Course/Seminar	17	0-5
10c	Resident Expert/OJT	18	0-5
10d	Self Teaching	19	0-5
10e	Other Outside	20	0-5
11	Training Quality	21	1-5
12	Easy to Learn	22	1-9
13	Easy to Get Them to do	23	1-9
14	Easy to Understand	24	1-9
15	Flexible to Interact With	25	1-9
16	Easy to Become Skillful	26	1-9
17	Overall Easy to Use	27	1-9
18	How Familiar with EIC?	28	1-4
19	Future Effect of EIC	29	1-4
20	Do Tasks More Quickly	30	1-9
21	Improve Job Performance	31	1-9
22	Increase Productivity	32	1-9
23	Enhance Effectiveness	33	1-9
24	Make Job Easier	34	1-9
25	Overall Useful in Job	35	1-9
26	Year Entered Service	36 &37	00-93

Question #	Name	Field(s)	Value Range
27	Present Grade	38 & 39	1-15
28	Years of VI Experience	40 & 41	1-50
29	AFSC	42	1-4
30	People You Supervise	43 & 44	00-99
31	Gender	45	1-2
32	Educational Level	46	1-4